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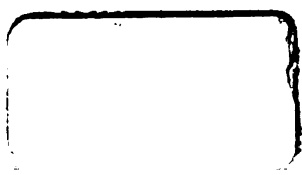
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IN THE AUSTRALIAN BUSH



In the Australian Bush

AND ON THE COAST OF THE
CORAL SEA

BEING THE EXPERIENCES AND OBSERVATIONS OF
A NATURALIST IN AUSTRALIA, NEW GUINEA
AND THE MOLUCCAS

BY

RICHARD SEMON

WITH EIGHTY-SIX ILLUSTRATIONS AND FOUR MAPS

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TO
PROFESSOR ERNST HAECKEL

THE PIONEER
OF PHYLOGENETIC RESEARCH

AND TO
DR. PAUL VON RITTER

THE HIGH-MINDED SUPPORTER OF THIS SCIENCE

I DEDICATE

THIS ACCOUNT OF AN EXPEDITION DESTINED TO BRING SOME
PHYLOGENETIC PROBLEMS NEARER THEIR SOLUTION

PREFACE

WHEN I started on my two years' journey to Australia in 1892, the aims which I had in view, and ideas which influenced my movements were chiefly zoological. It was the study of the wonderful Australian fauna, of the Oviparous Mammals, Marsupials, and of *Ceratodus* which I considered my principal task, on the achievement of which I concentrated all my energies. The satisfaction I enjoyed in approaching the problems in question, and in bringing them nearer their solution, I owe in the first place to the liberal pecuniary support granted to the undertaking, which I had begun on my own account by Dr. Paul von Ritter. Next to him, I shall always feel sincerely grateful to Professors Haeckel and Fürbringer, whose help and advice were of eminent value to me. Last, but by no means least, I feel bound to express my heartfelt thanks to the new friends I found on my journey, for the kind and unselfish interest they showed in my aims, and for the assistance with which they were ever ready to support my undertaking. My gratitude is due in the first place to Mr. M'Cord of Coonambula and to his amiable family; to Dr. Melchior Treub, Director of the Botanic Gardens at Buitenzorg; and to many others, whose names, though I must refrain from citing them one by one, will always occupy a prominent place in my thankful memory.

The scientific gatherings of my voyage are being examined and worked out by myself and by a number of zoologists and anatomists, and the results of our investigations are being published in a purely scientific work, under the title of *Zoologische Forschungsreisen in Australien und dem malayischen Archipel*. Twelve parts of which have by now appeared, whilst fourteen are about to follow.

Much however, that I experienced and observed during my travels is ill-adapted to that work, which appeals exclusively to the professed naturalist. Many occasional observations concerning animals and plants, countries and their inhabitants, and the impressions produced by the sight of the Australian Bush, the Coral Islands of Torres Straits, the tropical charms of New Guinea, Java, and Amboyna, as well as a general picture of that far Australian world, its continents and islands, could only find expression in the freer and more popular form of a book of travel. Thus it is that this simple narrative, which perchance may offer some special interest to the naturalist, is intended for the reader who likes to accompany a traveller to foreign shores and nations; for him who does not mind entering into his labours and worries, but who, on the other hand, may perhaps find pleasure in sharing his delight in nature and in human life, a delight awaiting any one happy enough to behold those glorious regions with clear eyes and a responsive mind.

The illustrations accompanying my account are, with a very few exceptions, originals reproduced from my own photographs of people and landscapes, whilst the animals have been drawn by Mr. A. Giltch from specimens brought home by me. My photographic apparatus, bought in Europe, having failed after a few months, I was forced to content myself with an old camera, which I purchased from a man who acted as blacksmith, watchmaker, and photographer to a small Queensland settlement. This purchase I have come to regard as a thorough piece of good luck, since it alone enabled me to produce illustrations at all, be they ever so inferior in quality.

May these pages go out into the world, a friendly companion to a reader wishing to wile away the leisure hour, a token of faithful memory to my numerous friends in the East, and of gratitude for their noble support of the German wanderer.

RICHARD SEMON.

PREFACE TO THE ENGLISH EDITION

IN offering the English Edition of my work to the British public I wish to state that it was written under my own superintendence, but that its contents do not differ in any important particular from the German edition.

At the same time, I am deeply indebted to Prof. G. B. Howes, who has been good enough to materially assist in seeing my work through the press, improving it, in so doing, in various directions, particularly by some alterations made necessary by the progress of science since the commencement of the book.

RICHARD SEMON.

MÜNCHEN, Summer 1898.

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CHAPTER I

FROM JENA TO QUEENSLAND

ANY man who feels the need of tearing himself away for some time from the even course of daily life, and who longs to see fresh sights, to enjoy works of past and present art, and to study the varying life of different nations, will find everything he seeks within the precincts of our venerable European continent. For do not the Alps, the Norwegian Fjords, the radiant shores of the Mediterranean, those haunts of ancient Hellenic and Roman culture, does not the throbbing life of our modern capitals or the attractive peculiarity of our Southern nations: Turks, Dalmatians, Italians, afford objects of interest equal if not superior to those of any other part of the world? He only who has exhausted these more attainable sights should extend his wanderings farther, betake himself to Egypt or India, contemplate the tropical charms of Ceylon or Brazil, or acquire an impression of the vast productive power centred in North America.

To a traveller of this order, in search of the picturesque or bent upon historical and social studies, Australia, the fifth continent, will afford decidedly less interest than any of the others, and I would never advise him who seeks pleasure of that description, and who has not seen the other parts of the world, to make it his goal.

Not so with the naturalist, above all with the zoological explorer. For him Australia will prove Eldorado, unequalled by anything else. For so singular are some aspects of the flora and fauna of Australia as to justify one in opposing the Australian region to all the rest of the world, and practical reasons only have prevented men of science from arranging their handbooks accordingly. Animals living in all the other continents—the feline and canine carnivora, cattle, antelopes, swine, insectivores, and monkeys—are either absent or non-indigenous in Australia; but compensating for

this deficiency, Australia possesses animals which have long since disappeared from the face of all the other continents. Such are the marsupials, which only survive in two American families besides, the oviparous mammals, which are restricted to Australia, and the lung-breathing fish *Ceratodus*, representing a type between fishes and amphibians, spread over the world in past geological epochs. Australia has appropriately been termed "the Land of Missing Links," because the above-named animals, to this day existing there, furnish connecting links between zoological classes which would appear disconnected if the animal forms of the four older continents only were taken into consideration. As we see in *Ceratodus* a link between fishes and amphibians, so do the oviparous mammals form a link between reptiles and the higher mammalia.

The fossils found petrified in the crust of the earth offer to the exploring naturalist nothing but a bony or cartilaginous skeleton, or the scales or shells of their former self, since we hardly ever find a vestige of their fleshy parts, their muscles, nervous system, and visceral organs. The study of the *living fossils* which Australia harbours in the above-named species is well adapted to fill these gaps in our knowledge. Of eminent importance, moreover, is the study of the embryological development of these "missing links." In the words of the great naturalist Carl Ernst von Baer, "embryology is the light-bearer to the knowledge of the human body"; and it therefore becomes very necessary to acquire material for the evolutionary history of these living fossils.

In June 1891, when I set out on my scientific journey, nothing whatever had been recorded with regard to the development of *Ceratodus*. Concerning oviparous mammals no developmental facts were known but that of their laying eggs, and an interesting observation about the teeth of young *Ornithorhynchus*. The knowledge of the full-grown animals was also deficient, and the anatomy and development of marsupials had not been in any way sufficiently studied.

Thus it was that I chose Australia as my first and main field of action, and within Australia those quarters which harboured the animals chiefly exciting my interest. Marsupials live everywhere within that continent, as does the oviparous echidna, whilst *Ornithorhynchus* is limited to the east and does not go farther north than the 17th degree of south latitude. *Ceratodus* inhabits but two small rivers of the east coast, the Mary and the Burnett River in Queensland. Having made up my mind to begin work in these parts, I arranged my plans accordingly. I did not, however,

limit my studies to this region exclusively, nor to this line of research, but extended my travels to the north of Queensland, the islands of Torres Straits, New Guinea, the Moluccas, and Java. In all these places I studied and collected as many as possible of the objects brought to my notice. But the central point of my doings lay in Australia, and in the study of its wonderful fauna.

The propagation of most of the Australian mammals sets in towards the end of winter or the beginning of spring, unless, as in some cases, it goes on throughout the year. The seasons being reversed on the southern hemisphere, where they have summer during our winter-time and spring, while autumn reigns in Europe, I had to begin work at the latest in August, which month corresponds to our February.

On the 13th of June 1891 I left Jena, then arrayed in its loveliest garb of young leaves and bright meadow flowers. My luggage, consisting of thirteen boxes and cases, containing my clothes, books, instruments, chemicals, and glass, as well as my shooting and fishing implements, I sent on beforehand. Not being superstitious, this "unlucky" number did not disconcert me; but, laughing away the ominous croakings of one of my friends, who was a staunch believer in this gloomy omen, I set out on my trip in the brightest and most sanguine of moods. Having some time to spare before my ship started from Genoa, I resolved to bestow a farewell glance on the beauties of the old world. Thus I lingered at Lucerne, to take in a last sight of our glorious Alps, climbed the Rigi, and cast a look on the Italian lakes and their laughing shores, radiant in the voluptuous glory of young summer time. Arrived at Genoa, I found that I had yet four days left to me, the arrival and departure of my steamer being somewhat delayed. Genoa itself, Pegli and Monaco, the whole coast of the Tyrrhenian Sea, crowned as it is by all-glorious Naples—have they their equal in east or in west, in the Tropics or on the Southern Hemisphere? Nothing, I am sure, exists that deserves to be compared to these gems in the garment of the world. But cannot the charm accompanying the research of the peculiar and the unknown vie with the delight afforded by the enjoyment of absolute beauty?

At last my steamer, the *Nürnberg* of the North German Lloyd fleet, bound for Sydney and coming from Bremen, made her appearance in the harbour of Genoa. She was rather an old vessel of 2000 tons, employed in these big voyages only during the dead seasons. Now her service is limited to short sails along the coasts of China and Japan.

It being generally known that during July the passage across the Red Sea is suffocatingly hot, whilst the Indian Ocean is liable to be very tempestuous, few first-class passengers cross at this season. On arriving on board I found only one, a second joining us at Ceylon, whilst five adults and two children occupied the second class, and more than a hundred emigrants the steerage. Besides these passengers, the *Nürnberg* carried some German troops, five officers, and about one hundred sailors, a relief crew for the German man-of-war *Sperber*, then stationed in the South Sea.

I soon made friends with the jolly and enterprising young officers, splendid sailor types, and we passed many a happy hour together during the following six weeks, enjoying ourselves equally on board and on land, where we undertook some very merry excursions. As there exist "a thousand and one" descriptions of similar passages of life on ship-board, of flying-fish, and of visits to the coasts touched by the ship, I will refrain from trying my reader's patience with an attempt of this sort. Life at sea is to my taste a monotonous affair. I soon begin to miss physical exercise, and to feel like a prisoner tied to a couple of planks midst the freedom of an unbounded ocean. Every sojourn on shore seems a relief. But generally the time for such is very brief, and gives you no opportunity for receiving any but the most superficial impressions. While a sail of a few days along an interesting coast or on the open sea is among the most delightful pastimes, voyages of weeks or months across the ocean are to me as a downright torture. Really beautiful, however, are the quiet evenings and nights in the tropics, when the ship will glide along the surface with a swift yet gentle movement, and a mild freshness will relieve the traveller from the heat of day-time, when the moon will shed her fairy radiance over the tranquil waters, while the beautiful well-known constellations of our northern heavens are joined by the radiance of the Southern Cross and the wonderful Scorpion.

On our way from Genoa to Messina we passed between the islands of Corsica and Elba, and close to the Ponzo and Lipari Isles. On approaching Stromboli during the night, we perceived two great bands of lava, winding down like glowing serpents from the summit of the crater to the sea.

The next day we passed Crete, and two days after, on 29th June, we cast anchor off Port Said. Hardly had our feet touched the ground, when a couple of musical bands began to strike up, inviting the new arrivals to the joys offered by some pseudo-elegant

"restaurants," which were decorated with a sort of shabby gentility. At the same time a motley crowd of pedlars came running by, Egyptian boys offered us their "nargilehs," while gorgeously dressed-up "ladies" tried to excite our attention. When we returned on board, some hours later, the vivid picture had disappeared as if by magic, and the whole place seemed to sink into dead and sullen silence. But just as we weighed our anchor, a French steamer coming from Aden appeared on the scene, at once awakening the place to renewed life, and receiving a welcome as noisy as that vouchsafed to us a few hours before.

After seventeen hours spent in passing through the canal, we arrived at Suez, where we made a short stay. Then we set out again, sailing along the finely shaped Sinai mountains, all aglow in the desert sun. We passed the azure waters called the Red Sea between the 30th of June and the 5th of July, and, having the wind in our back, we were exposed to the unbroken heat of that notorious pool, compared to which a baking oven seems a cool retreat. This state was rendered doubly aggravating by the fact that, even during the night, the temperature did not sink below 90°. Hardly had we passed Perim and entered the Gulf of Aden, through the Strait of Bab-el-Mandeb, when a south-west breeze fell upon us like a cool shower-bath. Our stay at Aden, which lay before us parched with heat, was too short for us to go on shore. On the other hand, our ship was soon alive with a crowd of Arab dealers, of Jews and Somalis, who established a sort of market on the deck; an exhibition of antelope horns, saw-fish saws, sun-fish, and globe-fish, shells, mats, baskets, and ostrich feathers. I was particularly interested in several Somali boys of splendid bearing and of noble, almost Caucasian, features, who had nothing of the negro type but the black velvety skin.

On leaving the Gulf of Aden, we were at once hailed by a strong north-west monsoon, announcing the neighbourhood of the Indian Ocean. Our steamer had to battle against this powerful wind for four days. While below all the hatches were closed, existence on deck was rendered impossible, wind, rain, and waves making it their playground. No wonder that all of us lost our appetites more or less, while I refrain from picturing the more serious symptoms shown by some particularly afflicted passengers. All the while the sea was alive with flying-fish, which were often blown on board to us, especially at night. When wounded by the fall, their alimentary contents strewn about the deck shone very brightly, a sign that their food chiefly consists of phosphorescent organisms.

On 11th July we passed the beacon of the little island of Minicoy between the Laccadive and the Maladive Islands, casting anchor off Colombo on the 12th. The twenty-four hours we spent there were a wonderful change, and a real treat after all the unpleasantness of our passage. What a splendid glowing picture does not this town and harbour of Colombo present to a stranger fresh from the North! And how delightful was that first glimpse into the strange life of the East, and into the picturesque groups of Singhalese and Tamils swarming in the streets of the little city! The comfort of the Oriental hotel was doubly felt after the annoyances we had gone through, and the Singhalese curry, there enjoyed by me for the first time, formed a pleasant change after the monotonous fare of the steamer. A *djnrichka* drive at night, its charm enhanced by millions of glow-worms, and a morning excursion to the celebrated temple of Buddha made my stay at Ceylon appear to me like an oasis to the wanderer in the desert. Hardly had we left Colombo, when our vessel began her pitching and rolling course anew, as the result of a violent storm raging many hundreds of miles away from us.

On the evening of 15th July, "Triton" appeared to us on board, announcing the visit of "Master Neptune" for the following day, on which we were to cross the Line. In the form of a fiery ball his herald, after having delivered this message, skipped overboard again, and for a long time afterwards we saw his glowing shape dance on the track of our ship. Was it the god himself, or was it merely a burning barrel of tar which marked his path? For many days before there had been mysterious goings-on amongst the marines, all in honour of the famous ceremony attendant on the crossing of the Line. On the 16th of July at noon "Neptune" himself appeared on board, trident in hand and adorned with a mighty flaxen beard. He was accompanied by a wonderful suite, composed of the "Lady Amphitrite," "Triton," some police-officers, niggers, doctors, barbers, a clergyman, and a lawyer. Several fine speeches in verse were delivered, and some medals distributed, whereupon began the solemn baptism of those who were for the first time crossing the Line.

The baptismal rites consisted in a great scrubbing and soaping of the victim, and in his being shaved with an enormous wooden razor. In some particularly serious cases the poor novice is driven through a wide linen sail, a forcible dash of water speeding him on his way. At last a pig is shaved and baptized, the summing-up of the whole ceremony being a general splashing and dashing of water at one another, and a ducking and dipping of everybody all round. In

the evening a solemn carousal of the corporals and crew, to which all of us contributed our mite, crowned the festivities of the day. All these ceremonies have been discarded on board the larger steamers, most modern travellers being too strait-laced for practical jokes of this kind. On our good ship, however, the festival was a private arrangement of the marines, in which all the crew and many of the passengers took part with the utmost glee.

On 19th July our engines stopped all of a sudden. This was owing to an accident which had befallen the piston of the air-pump. The twenty-four hours it took to repair this damage were spent by us in swinging to and fro *ad nauseam* on the Indian Ocean, a contrary wind which had blown in our faces from the south-east ever since we had crossed the Line preventing us from putting up any sails.

During the night of 27th July we passed Cape Leeuwin, and the next morning brought us alongside the mountainous south-west coast of Australia. Here we were joined by a flock of albatrosses, which accompanied our vessel as far as Adelaide, where we cast anchor four days later.

Here it was that I trod the Australian soil for the first time, and I must own that this step over the threshold of that unknown continent impressed me very agreeably. Adelaide, though the capital of South Australia and boasting of more than 130,000 inhabitants, wears rather a rural than a metropolitan character. Its streets are broad and clean, and its public buildings show a stately appearance, while the private houses have a villa-like look, and are adorned with shady verandahs and balconies. Gardens and pleasure-grounds further embellish the scenery, the background of which is formed by hills of a picturesque shape. Adelaide, Melbourne, and Sydney have so often been described that I, who stayed so short a time within their walls, will desist from giving an account of these places. My visit to the noisy and populous Melbourne was accompanied by abominable weather. Still I went to see my celebrated compatriot Baron von Mueller, one of the pioneer explorers of Australia, and a leading authority upon the flora of that continent. He received me most cordially, and gave me valuable advice concerning my further plans.

At Sydney I remained a week, bent on acquiring some clearer ideas about Australia generally and Queensland in particular, and about the mode of living and travelling there. Sydney may be proud of its situation and, above all, of its harbour, Port Jackson, which has not its equal in all the world. While in beauty it is far

exceeded by the Bay of Naples, in other respects it surpasses any port I know. Topographically speaking, Port Jackson reminds me of a Norwegian fjord, except that low hills instead of high mountains surround its shores. The main fjord, forming at first a number of irregular curves, ends in a long and narrow stream of water, the so-called Paramatta River, which, far from being a real river, is merely a continuation of the bay. It sends out several arms and water courses on both sides deep into the surrounding country. Here and there little hilly islands vary the scene, whilst all the banks are gracefully dotted with trees and gardens down to the water side. Innumerable houses and villas glance through the verdure, and the blue waters of the bay are alive with large and small vessels, and with boats and sails of all colours and sizes.

The disposition of land and water, of promontories, wooded hills, islands and bays, the contrast of blue sea and reddish soil, of green shrubs and white houses, the whole spread out under a clear Australian sky, produce a truly delightful picture, which nobody who has had the privilege of beholding will ever forget. The half-tropical, well-cultivated Botanic Gardens, on the north-eastern point of the peninsula on which the whole town is built, surpass in beauty of situation any other institution of the kind.

Many hours a day I spent in the excellent Museum for Physical and Ethnographical Science, a living testimony to the public spirit of this young state, which may be justly proud of its splendid buildings, its excellent institutes, and its culture generally. I was received most amiably by my scientific colleagues of the University and the Museums of Sydney, as well as by the German Consul, Mr. Sahl, who was likewise very obliging, opening to me his hospitable home, where I spent several very pleasant hours.

After a stay of six days at Sydney I left by the *Barcoo*, bound for Brisbane. The weather, meanwhile, had cleared up splendidly, and our steamer was alive with a gay crowd of passengers. We had on board a football team, going in for a match with the Queenslanders. The youngsters reigned supreme over our ship, filling it with laughter and noise. When approaching the quay at Brisbane, they coaxed our captain till he hoisted a football on the top of the main mast, and great was the joy of the Brisbane sportsmen when we landed under this sign. The scenery of the coast became more and more interesting as we passed Stradbroke and Moreton Island, which bar the passage from the south. Now we entered Moreton Bay, and were greeted by the wonderfully shaped volcanic cones of the "Glass Houses," rising on its northern banks. Brisbane itself

has not been built near the sea, but about twenty miles up the Brisbane River, along both of its shores and encircled by its mighty curves. The so-called city lies on the left bank, while the elegant and more frequented part of the town is encased like a peninsula in a V-shaped portion of the stream.

I visited Brisbane three times, spending there altogether nearly four weeks, and grew very fond of the charming town, which is favoured by a splendid climate. The first time I stayed at the agreeable Bellevue Hotel, later in the elegant Queensland Club, of which I was made an honorary member on the recommendation of my new Queensland friends. To live in these comfortable palace-like clubs instead of hotels is a particular advantage of Australian travel, accorded, however, only to those who are either members themselves or have been introduced by members. The Queensland Club in Alice Street, Brisbane, is situated opposite to the green Queensland Park, which forms a part of the Botanic Gardens. The park is laid out on an area encircled by another bend of the river, and contains the residence of the Governor. Nearly opposite the Club lies the House of Parliament remarkable for its handsome architecture. Brisbane was founded in 1825 as a settlement for deported convicts, and opened to free colonisation in 1842. Since that time it has become a most flourishing town, which now, the suburbs included, possesses 100,000 inhabitants. It is a bright place, with broad and well-kept streets, and pretty houses ornamented with verandahs and surrounded by gardens. The main thoroughfare is the broad and lively Queen Street, where business life reigns supreme. Here are the principal public buildings, the Government Office, the Queensland National Bank, many other big commercial buildings, and shops upon shops, whilst the private houses are mostly situated in the quiet by-streets. The one-storied houses generally possess an airy verandah skirting their front, while the two-storied add to this a broad balcony on top of the verandah, shaded by a broad marquee. This style of building, and the palms, bananas, and bamboos thriving in the gardens, unite in giving the town a half-tropical character.

I visited our German Consul, the Hon. Joh. Christ. Heussler, to whom I had an introduction from our Foreign Office. Mr. Heussler did everything possible to further my aims, acquainting me with magistrates and private persons likely to be of use to me. I further feel very much indebted to the German physician, Dr. Eugen Hirschfeld, to Mr. John Hamilton, M.L.A., to Messrs. Frank and Alek Ivory, formerly squatters on the Burnett, and, above all, to

the Under Colonial Secretary, Mr. William Edward Parry Okeden. It is owing to his active support that I was enabled to make my preparations quickly and effectually, to obtain special introductions for my further travels in Queensland, charts and official reports from the Ministries, and that the duty on the alcohol necessary for my work was remitted. This latter act was of greatest importance to me, and the permission was only granted after the purely scientific character of my journey had been ascertained. Mr. Okeden also introduced me to his brother-in-law, Mr. M'Cord of Coonambula, then on a visit to Brisbane. The kind help afforded me by the latter greatly contributed to the success of my journey, while his hospitality cheered my lonely life in the bush in the most delightful way.

I shall always bear the utmost and warmest gratitude for the kindness with which every one in Brisbane and in Queensland generally responded to my scientific aspirations and desires. Everybody was eager to help and to show me everything worth seeing. Among other things I was much impressed by the fine and well-conducted hospital and the Museum, interesting by the abundance of its Queensland fossils. The director, Mr. C. W. de Vis, known by numerous palaeontological researches, rendered me a great service later on in helping me to procure embryos of that wonderful Sirenian genus the Dugong.

Mr. Hamilton conducted me through the House of Parliament, enabling me to be present at a sitting. Minds were in great excitement just then. The Australian colonies have, like the old world countries, their socialistic movement, and though not of quite the same importance as in New South Wales, the "labour question" already begins to play a part in Queensland life.

There was another topic on the political horizon just then, which greatly excited the Queenslanders—viz. the question whether the enormous colony of Queensland might not be divided into three parts—a southern, a middle, and a northern—which might be just as autonomous as Queensland was in relation to the other Australian colonies? The supporters of this scheme argued that Queensland itself, then called Moreton Bay District, was formerly but a part of New South Wales, and was only separated from that in 1859.

The connection between the different colonies is in fact a very loose one. They have in reality self-government, the governors sent over from England occupying a purely representative position and having just as little influence in the legislation of the Colonies

as the sovereign has in the mother country. The only tie which binds the Colonies besides is the possession of a common fleet, stationed in the Australian seas and placed under the command of an English admiral. This fleet has only recently been constituted, in case the mother country should be engaged in war with another great power, and that a defence against sudden attacks should be necessary.

While many Australians desire a closer connection of the Colonies, after the model of the United States of America, some Queenslanders ardently wish for the above-mentioned separation of their own big colony into three parts. This desire results from purely economical considerations. A considerable part of the revenues of the Colony is derived from its central and northern districts, which possess the most remunerative gold mines and the greatest herds of cattle. Consequently the middle and north Queensland harbours the opinion that, by the present combination of Parliament and through the centralisation of power at Brisbane, the closely populated south is too favoured as compared to the middle and northern districts, and that the balance of benefit rendered and received is no even one. Till now they have little chance of realising their separatist desires. One day, however, when the population in the northern parts of Queensland in South and West Australia will have increased, the Colonies will probably follow the course adopted by the United States of North America with such eminent success.

The interest in politics is very lively in the capital of this young state, but slighter in the small towns and settlements. Very strong, however, is a tendency for speculation, particularly in gold mines, and great the love of sport, principally racing. You may enter any circle you like at Brisbane and you will be sure to find the conversation turning on one of these topics.

From Brisbane I took a trip up the river to Ipswich on the Bremer River, an affluent of the Brisbane. This prosperous town lies in a district of good economical resources, and the wealth contained in its coal mines ensures a good future to the young settlement. I also visited Sandgate, a little seaside resort on Moreton Bay, where I enjoyed a good bathe and the pretty sight of the bay. This time I took the train for Maryborough, while later on I made the same journey by ship along the coast. The railway journey furnishes many interesting sights. On leaving Brisbane, one passes long fields of pine-apples, growing in regular rows like cabbages or turnips. Before reaching Gympie the railroad traverses a dense

tropical forest, an impenetrable wall of mighty palms, fig-trees, araucarias, and dammara trees following the track. Creepers wind from tree to tree, whilst within the branches mighty epiphytic ferns and curious yellow-brown orchids have made themselves a home. The character of this virgin forest is exceedingly different from the usual Australian landscape, which alternates between the open park-like eucalyptus bush and dense acacia thickets or scrubs. Further on I shall try to explain the different reasons for the many incongruous types of Australian vegetation.

We soon reached Gympie, one of Queensland's chief gold districts, a settlement of nearly 8500 inhabitants. The precious metal was first discovered here in 1867, and during the following twenty years gold to the value of two million pounds has been produced. The production is still very abundant. Gympie lies near the middle course of the Mary River, its harbour being Maryborough. Although situated 37 miles above the mouth of the river, vessels of medium size are able to land here when assisted by high water.

During my various stays at Maryborough I became familiar with its important harbour, which serves for exportation of all the principal Queensland productions, the metals from the mines of Gympie, Kilkivan, and other places, the timber from the richly wooded inland districts, and the sugar from the plantations near the lower Mary River. We get the impression of a wealthy and prosperous town, and are greeted everywhere by the signs of the Australian citizens' public spirit, which shows itself in the erection of stately public buildings, of schools and churches, in public grounds, and a school of arts. This latter institution may be found in every Australian township, and in almost every little settlement. It principally consists of a public library, for the use of any one who chooses to pay a small annual contribution. In the smaller places the school of arts is represented by nothing but a little house, where you find the principal Australian papers and the weekly edition of the *Times*. In towns like Maryborough it is a stately building, with a library of 4000 volumes, a pretty museum, reading-rooms with numerous Australian and English papers, and some French and German weeklies. Another never absent feature of every considerable Australian town are its "gardens," an object of tender care and solicitude to the pioneer, and much frequented by all citizens. While wandering about the town on the eve of my arrival, I suddenly met a stream of people with music and torches, and my ears were greeted by the fine old students' tune "Crambamboli,

das ist der Titel." Was there a society of former German students at Maryborough who had hastened up to hail my arrival? But no, it was the Salvation Army! whose masculine and feminine champions had adapted this jolly melody to some pious text. The Army extends over a great part of the Australian coast, and though the opinions about its merits are divided, its good influence on the lower classes is generally acknowledged.

On the next day I visited a sugar plantation near the river, the "Island Plantation," and saw the sugar-cane in all the stages of its growth. The plant having reached a sufficient height, its crown of leaves is cut off and used for feeding cattle. Now the juice of the cane is pressed out by machines, whereupon the cane is moistened and pressed a second time. Finally the juice is blended with chalk and led through pipes into special tanks on board steamers built for the purpose, which take it to the refineries.

The worst part of the work in the sugar plantations is the removal of dry leaves from the thicket of canes, which no breath of air ever enters. The temperature reigning there is quite unbearable by white men.

It has therefore become necessary to employ the natives of the South Sea, the so-called Kanakas, for the cultivation of the sugar-cane. The custom of recruiting workmen for these plantations from the South Sea Islands had led to such hideous brutalities in former times, to such an amount of slave-dealing and kidnapping, that public opinion had revolted against the whole concern. The jealousy of white workers, who would not have their wages reduced by "black work," also played a part in the movement. Soon, however, it was clear that Kanakas were indispensable for that exhausting labour, and so they were summoned once more, the management being now, however, subjected to a careful control by the Government.

The agency firm recommended me, "Graham and Gataker," furnished me with valuable advice of different kinds. Mr. John Graham had himself been living for some time on the Middle Burnett, and was agent for most of the squatters there. His help was very useful to me during my long stay in the Bush. The communication between myself and the coast was managed by him. He was always ready to send me such articles as were not to be had inland, he received my collections and shipped them for Europe. Also it was he who first told me that *Ceratodus* did not live in the lower parts of the Mary and Burnett, therefore neither near Maryborough nor Bundaberg, but farther up the river, beyond the

influence of the tide. He advised me to take up my headquarters near the middle course of the Burnett rather than near that of the Mary River, and I am glad to have followed his advice. So I settled, first of all, to go to Gayndah, a small place near the Middle Burnett, and to see what work could be done there. On the evening of 23rd August my preparations were so far completed that I could seriously think of going about my task.

CHAPTER II

OFF TO THE BURNETT

MOST of my readers will smile, and only a brother naturalist will sympathise with me, when I own that an almost solemn feeling overcame me as, on starting from the little station of Maryborough, on the morning of 24th August, I began my pilgrimage to land sacred to the zoologist.

Once a day a train leaves Maryborough in a western direction, reaching the little settlement of Biggenden, at present the final point of the line, in about four hours. This line has been principally built for the transportation of timber to the coast, or rather to the lower navigable part of the Mary River.

The country behind Maryborough is rich in good timber. A great quantity of so-called pines from the woods traversed by the railroad are brought to the railway stations and thence taken to Maryborough, where they are cut into beams and rafters and then shipped. I saw some schooners laden with Maryborough rafters in the farthest north of Australia, on Thursday Island in Torres Straits, where the wood is used for the manufacture of the boxes serving for the exportation of mother-of-pearl. I ought to remark that *real* pines and firs are entirely wanting in Australia. It lacks pines, firs, larches, thujas, and cedars. Instead of them araucarias, dammaras, cypresses, and podocarpeae abound in the coast districts, and furnish an excellent timber. The colonist calls every conifer a pine. He distinguishes between Kauri pines (dammara), Moreton Bay pines (araucaria), Cypress pines (callitris), "She pines" (podocarpus), and others. The sort most valued and best adapted for building purposes is the Queensland Kauri, *Dammara robusta*, which grows on the coast district between Moreton Bay and the mouth of the Burnett, and very densely near the lower course of the Mary and Burnett rivers.

At about ten o'clock I arrived at Biggenden. A little bismuth

mine is worked here, the metal being obtained by washing a deposit containing principally magnetic ironstone. The difficulty is to separate ironstone and bismuth by this washing process, the specific weight of both these metals being very similar. The bismuth mine is framed by a high granite bank in the west, and a narrow strip of chalk-rock in the east. To its north we find considerable layers of silicious schist. From Biggenden to Gayndah I had to make use of the coach. An Australian coach does not resemble the ponderous vehicle serving this purpose in Europe, in all variations from the yellow monster of Swiss passes to the more elegant but likewise capacious English "coach" threading the Scotch valleys. The Australian coach has to dispense with level roads and to be up to all sorts of climbing tricks. Pathless country, creeks, swamps, and gorges lie across its track, and have to be avoided or surmounted. This purpose is best served by a light open buggy, that has room for five or six persons and the coachman. There is generally an awning in case of rain, but sometimes this useful requisite is sought in vain.

The coach is mostly drawn by four horses, which are, however, rarely well broken in like our post-horses. The service is a very hard one in these parts and soon ruins the poor beasts, the more so as the cheapness of horses does not make it worth peoples' while to take proper care of them. This is the reason we generally find young untrained horses drawing the coach, which have sometimes been in harness but once or twice before. Of course great skill is necessary to guide such a team across the rough country, and in fact you rarely find such excellent driving anywhere else. Not only must the driver fix his attention on his four-in-hand, but upon the road and the state of the ground, lest the coach should stick fast in a swamp. He must develop real sagacity in creating new passages when the old road has been destroyed by the elements, and must possess cold blood in case of accident. In short, he must be a perfect "bushman." Accidents of different kinds are quite the rule in Australian travel, and I have experienced them more than once.

My first drive, however, from Biggenden to Gayndah proved quite a success. Our driver was an "old hand" and went about his duty with imperturbable dignity. Our way led us across level ground, past the squatters' station Degilbo¹ and the gold-field Mount Shamrock. There gold and silver are found intermixed

¹ "Degilbo" is no native name, but the reversed form of "obliged," recalling certain little incidents in the life of its owner.

with bismuth, magnetite, iron, copper, and other ore. The layers lie among extensive fields of sandstone strata, surrounded and here and there interrupted by basalts. Mount Shamrock itself is a low hill of about 150 feet in height. The gold was first discovered on its summit, in the form of an iron-coloured piece of rock that lay loosely on the surface of the ground.

Here we took a short rest and had dinner in one of the inns. Wherever the smallest settlement begins to thrive, you instantly see a number of "hotels" arise above the ground. The price for board and lodging is generally a high one, the meals simple and good, the rooms very primitively furnished, the cleanliness tolerable. The principal source of profit to these inns is their bar. Here many gold-diggers and stockmen spend most of their hard-earned wages, some of them every farthing they gain.

Between Mount Shamrock and Gayndah we changed horses once more near the squatter-station Wetheron. Not far behind Wetheron we met a black man on the road. He seemed to be a friend of the driver's, who bade him a cordial welcome and made him get into our coach. He was a well-built sturdy fellow of medium height, with black wavy hair and a rough beard. His narrow laterally compressed forehead, his broad cheekbones, flat nose, and big narrow-lipped mouth made him an excellent representative of the Australian type, which has to my taste nothing ugly or disgusting. Our new companion was dressed in a shirt of European make, and in a pair of ragged trousers, the elegance of his attire being, however, somewhat alloyed by his appearing entirely barefooted, bareheaded, unkempt, and unwashed.

In Brisbane I became acquainted with a Burnett squatter, Mr. W. F. M'Cord of Coonambula, and he had recommended to me a black named Frank from the Gayndah region as best adapted to act as agent between me and the blacks, to explain my wishes to them, and to be of help in my searches for the desired animals. It was a pleasant surprise for me to find that our new travelling companion, the first black who crossed my path, turned out to be this very Frank. He was immediately ready to enter my service, to procure me other blacks, and to find and catch any animal I desired. He did indeed fulfil a part, but not the whole, of his promises, and at last he even damaged my interests, so that I refused his services during my second stay on the Burnett.

On this afternoon, however, we passed along together in perfect amity. Had I been of a superstitious turn, the sudden appearance of this black, in whose person I centred so much hope at my

very first step into my new work and bush life, would have been considered by me as a good omen.

We now entered a mountainous country, wavy hills and dales, which were evenly covered by light eucalyptus woods. Towards four o'clock we crossed Barambah Creek, near its entrance into the Burnett, and stopped for some minutes at a lonely house on the roadside. It belongs to a small farmer, who has a license to sell liquors, and receives travellers for money. This permits the house to claim the proud title of an "inn." Of course the bar is of secondary importance, as months go by without a stranger's making use of it. Primitive inns of this kind are a standing feature of those Australian districts just becoming opened up to civilisation.

To our west higher mountains arose, and the ruggedness of the ground increased. In turning a slope of the hill, the driver pointed with his whip to the picture just before us. There lay the deeply cut broad valley of the Burnett. In its depth we perceived the river, at the time somewhat dried up, winding along. Towards the west, two curiously shaped hills, Mount Debateable and Mount Shamrock closed the view. Between them the little settlement of Gayndah spread out around a low hill, covering an extensive piece of ground, such as might serve for a town of a hundred times its population.

The main street, the houses of which are built at long intervals from each other, follows the river for about two miles, running along the top of its right bank. Many houses are flanked by little gardens and plantations, and the vivid greens of orange and lemon trees, which are very much cultivated and thrive splendidly, afford an agreeable change for an eye tired of the faint bluish-greens of the eucalyptus bush. The number of inhabitants is said to reach 500, but it appeared to me decidedly less, and is continually decreasing. When the colonisation of the Burnett district began thirty years ago, the land was used for pasture and furnished the means for breeding a valuable and lucrative stock of sheep. Gayndah became the central point of this most promising wool-producing district. This state of things continued for some time, till by degrees the pastures began to degenerate, and the keeping of sheep grew impossible and had to be given up. And when we seek the reason of such a lasting deterioration of an extensive pasture, we find it due to the animals themselves. The pasture in these parts of Queensland consists of several kinds of grass. Only some of these are nourishing and wholesome for the sheep, which consequently show a predilection for the same; the rest are harder, more silicious

and less tempting to the palate. The sheep are exceedingly clever in picking out the better grasses from among those of lesser quality, and since this continual thinning is prejudicial to the better kinds of grass, as it prevents their blossoming, and, on the other hand, causes the inferior grasses to grow and thrive, it produces at last a total destruction of the better kinds, a process we may very well describe as "survival of the unfittest." Moreover, those hard silicious kinds of grass have particularly rough and pointed "beards," which catch in the fleece of the sheep, work themselves into their skin, and frequently lead to the death of the animal. Cattle and horses also prefer the softer grasses. The dimensions of their mouths, however, prevent them from carrying out a real selection. The "beards" of the grass do not harm them, furnished as they are with a short smooth hair and a hardy skin.

These circumstances forced the settlers to give up sheep-breeding, and to adopt the less lucrative rearing of cattle and horses. Great losses befel the owners of sheep, and Gayndah, that had thriven on the trade between the wool-producing districts and the coast, lost its livelihood, and sank into insignificance once more. Besides this, the gold trade, beginning to flourish in the environs, at Mount Shamrock, Eidsvold, Paradise, and other places, attracted the younger enterprising section of the Gayndah population. This now principally consists of some small farmers, mostly Germans, who produce just enough to meet their own wants, and who generally follow some trade besides. Then there are the official persons belonging to every Australian settlement; the police magistrate, the doctor, the parson, who has the entire district under his pastoral care and is consequently ever on the way, the postmaster, and the schoolmaster. Besides there are some shopkeepers, in whose stores one finds every article wanted in this remote part of the world; flour, tea, coffee, and conserves; spades, axes, knives and other steel utensils; clothes, linen, rugs, and hats; gunpowder, cartridges, fishing rods, and tents—in short, everything imaginable. The existence of such a general store in every small Australian settlement, which furnishes the traveller with articles he would vainly seek in many a bigger town on the European continent, is of great advantage to any one who does not want to be encumbered with a quantity of luggage. It is, moreover, a sign of the commonsense and enterprising spirit of the Australian pioneer. Of course Gayndah has its numerous innkeepers and landlords, with the corresponding "hotels" and inns; a bank, however, is wanting, and this is a fatal sign of the state of the town. Wherever a settlement thrives, a branch of one of the big banks at

Brisbane, or another of the southern towns, establishes itself, and opens an office in some little house under the management of one or two clerks. Some small mining towns of inner Queensland have two or three banks of this kind. They facilitate commerce considerably, all money affairs being then settled by cheque instead of cash.

I began by settling down in the Gayndah Club Hotel, and the little town, the people, and the inn being very much to my taste, I hoped here to be able to further my interests and fulfil my scientific task. The Club Hotel is a one-storied wooden house with a roof of galvanised iron. A verandah surrounds the front and admits you to the bar-room and to the two principal apartments, dining-room and parlour, that serve for the reception of guests, whenever there are any such beings about the place. The bedrooms at the back of the house are exceedingly simply furnished, but the beds are tolerable, and so is the fare. The price for board and lodging amounts to half a guinea a day, which is the rule in all the Australian hotels of a better order. The prices are the same at the elegant hotels of Sydney and Brisbane, as well as in the most primitive ones further northwards or inland. The landlady of the Club Hotel allowed me to arrange a wooden shed generally used as a spare room for my laboratory, and after a few days, the ox-cart carrying my luggage arrived from Biggenden, so that I was able to go about my zoological labours in good earnest.

I had been frequently told that I could find *Ceratodus*, *Echidna*, *Ornithorhynchus*, and marsupials of every kind just as well at Gayndah as in any other place near the Burnett. There were no blacks who could have helped me to collect in the neighbourhood at that time, and Frank, my travelling companion of the coach, had likewise disappeared from the scene. Several young fellows among the white settlers offered, however, to catch animals for me, and, as I paid them well, I soon received a number of *Ornithorhynchus*, and some days later a freshly caught living specimen of the "Burnett Salmon" as the settlers call *Ceratodus*. Marsupials, however, were very scarce, and still more so *Echidna*, the track of which on the hard rocky ground is invisible to any one but the falcon-eyed native, who follows the animal deep into the dense thicket of the "scrubs."

My sanguine expectations had been heightened by my finding eggs in segmentation in the oviduct of several *Ornithorhynchus* shot by myself and by my helpers. Soon, however, I felt somewhat discouraged by the scarcity of game, and began seriously to consider whether it would not be advisable to move deeper into the bush, and to

camp out in a place better adapted for my work. Many of my new Gayndah friends tried, however, to dissuade me from this plan. They depicted to me the difficulty of living and of pursuing scientific study in the bush, and seemed convinced that in due time Gayndah would furnish me with everything I desired. An intuitive feeling that this good advice did not arise from purely unselfish motives prevented me from following it. In this far-off corner of the world the presence of a stranger is a sort of diversion for the inhabitants, chiefly for those not overburdened with business. His occupations form an object of observation and critical comment. One likes to chat with him about his impressions of Australia, Queensland, Brisbane, and Gayndah itself. His inexperience in bush life, his lack of knowledge concerning things that are as natural to the Australian as the air he breathes, become a source of good-natured bantering. The Australian of the inland districts looks upon the stranger fresh from Europe, the novice in bush life as on a special class of beings, the "new chums," to whom he opposes the experienced pioneer, the "old bushman." Although I did not object to be reckoned among the Gayndah "sights," this could hardly be considered the principal aim of my journey. It was a point difficult to decide whether a camp life in the heart of the Bush, far from all resources and communication, would be better adapted for my purposes than a stay at Gayndah. The black native, Frank, who had reappeared in the meantime, was decidedly of this opinion, while the advice of most of the white settlers tended to the contrary.

Luckily I just then became acquainted with a gentleman who had long lived on a squatter station, and who now bred cattle on a "selection" near Gayndah. Mr. W. B. Maltby told me there could be no doubt about my arriving at far better results by camping out than by staying at Gayndah, or at a solitary roadside inn between Gayndah and the mining town of Eidsvold. If any profit were to be derived from my black helpers, I ought to follow them on their wanderings. He asserted that life in the bush had its own charms, and that there was no particular difficulty in carrying collections, glass, and chemicals, to the camp, nor in procuring the necessary camping outfit and provisions. Everything needful might be had in Gayndah, and he himself was ready to provide me with an experienced and reliable white companion.

This advice coinciding entirely with the views I had myself formed during my short stay at Gayndah, I immediately made up my mind. Frank was sent off to parley with a small tribe of blacks, then camping on the Boyne, an affluent of the Burnett, near the

squatter station Cooranga, and to take them into my service. I meanwhile furnished myself with the paraphernalia and provisions necessary for an extended camp life. Here the Gayndah "General Stores" proved very useful to me. I found a tent, axes, hatchets, spades, tin vessels, a little iron stove, flour, tea, and tins, and bought them at reasonable prices. Many useful objects were amongst the luggage I had brought with me from Europe. I then bought as a riding-horse a brown hack which I called "Shamyl," after the horse of a friend in Europe. "Shamyl," for which I paid rather a high price for Australia, turned out pretty satisfactory, but not quite strong and brisk enough for the frequent and extended rides I had to make. I therefore later on bought some younger and livelier animals from a squatter.

Mr. Maltby and my Gayndah friends advised and assisted me very kindly in all my purchases. The most important thing, however, was the choice of a trustworthy companion. For, in spite of my experience in travelling, and of my having lived in countries remote from civilisation, I felt convinced that camp life in Australia exacts special knowledge, only gained by practice and experiment, and that I had to consider myself a complete novice and to learn from others more experienced than myself. My recognition of this fact, my luck in finding good counsellors at Gayndah, and above all in hitting upon an in every way excellent and trustworthy companion, enabled me to get on so well from the beginning without having to buy experience too dearly.

Edward Dahlke, my faithful helpmate during my nine months' camp life on the Burnett, had come to Australia with his parents when he was four years old. His father had been a mason. After much knocking about in Australia, the family had settled in far-off Gayndah, where they lived on a small farm set up by themselves. The parents spoke faulty English in spite of their thirty years' stay in Australia; the children, however, had become perfect Englishmen or rather Australians, and were hardly able to express themselves in their mother tongue.

Beside the Dahlke's there were several other German farmers in Gayndah, and the British colonists and squatters were unanimous in their praise. This opinion is extended over the whole of Queensland, not to say Australia. Several British Australians of sound judgment have assured me that the modest, industrious, and thrifty German colonists are hardly equalled, and decidedly not surpassed by any other European nation. The spirit of enterprise on a larger scale, however, seems to be lacking in them. This results

from the fact that only Germans of the lower middle class and of modest means come to the bush as farmers and colonists. Among the squatters, who all recruit themselves from the higher classes, we find hardly any Germans. The numerous Germans, however, who live as merchants and tradespeople in the big commercial centres of the coast, do not seem to enjoy the unlimited admiration of my Australian friends to the same extent as the German farmer, although capacity and thrift are not denied them. I must own that my English authorities limited even their praise of the German settler so far as to declare him to be unequalled and first-rate in those cases only in which the colony is ruled by English hands. I have always contradicted the far-spread prejudice that Germans are not fit to govern a colony, and consider it false and unreasonable, although, I am sorry to say, facts seem to justify it so far.

The governing of colonies is an art to be learned patiently and without shunning any sort of sacrifice or loss of time. It is unjust to compare a nation whose first steps in that direction date only a few years back, to one aided by the experience of centuries, and to deny it every ability in this direction on the ground of mistakes undoubtedly committed. It does not surprise me that officials, recently arrived from Germany, should incline towards transferring views and measures suited to German life and historically developed there, into remote countries, where they are quite out of place. Matters will improve as soon as our supply of officials who have gained insight and experience of foreign customs shall have become larger, and we shall no longer be limited to beginners. Germany has a right to be proud of her young civil and military officers, and the young men sent out to our colonies by the Government represent a material as good as that of any other nation.

We hope yet to show that not only German farmers and merchants, but that also the agents of the German Government can vie with the colonists of any other nation. When I was obliged to take more white men into my service during my second stay on the Burnett, I chose them from among the young Australians of German extraction, and had never any reason to regret the choice.

Dahlke promised to furnish me, for the time of our travels, with a dray and with five strong draft horses, while for his own use he took several riding-horses. For his services, the dray, and the horses, he received £2 a week and free board. When he fell ill towards the end of my second stay on the Burnett and had to return to Gayndah, I gave him £1 a week for the further use of dray and horses.

While I was preparing for my expedition at Gayndah, Frank returned with the welcome news that the blacks, after whom he had been sent, were ready to hunt and catch animals, especially Echidna, on the conditions proposed by me.

On 2nd September everything was ready, and on the morning of the 3rd, Dahlke started for the Boyne with the dray, which was loaded to overflowing, Frank showing the way. As the dray had to follow the road for a considerable time and moved much slower than a rider, I gave it the start and remained at Gayndah a day longer, setting out myself on the 4th of September.

I used this day for paying a visit to the squatter of the neighbouring station, Mr. W. Humphery of Mount Debateable, accompanied by some of my Gayndah friends. We set out in two light buggies, belonging to Dr. A. Cole, physician at Gayndah, and to the surveyor, Mr. E. M. Waraker. One of them was occupied by the doctor and Mrs. Waraker, the second by Mr. Waraker and myself. Just before entering the station we had to pass through a paddock, and Mr. Waraker dismounted to open the gate. On my driving through the narrow opening, while he waited to close the gate behind us, one of the wheels touched a pole of the fence. The young fiery horses thus startled, pulled still further towards the wrong side, and the carriage overturned. This excited the horses to madness. They rushed frantically off, trailing the prostrate vehicle along with them. I had jumped clear in time, and tugged with all my might at the reins, which I succeeded in retaining in my hands. But I could hardly have managed to bring the frantic horses to a stop, had they not luckily raced right into the acute angle of a fence and been thus trapped. We had trouble to quiet the excited animals, which had, for a wonder, neither damaged themselves nor the buggy very seriously. Ten steps further, and the buggy would have been shattered by the trunk of a tree. As it was, some bends and bruises denoted all the harm done.

Our first shock soon turned into general mirth. I was congratulated by every one on this glorious feat, my introduction into bush life, and was assured of success for the future. My presence of mind was applauded, and my having saved the carriage from being shivered into atoms, was termed a feat liable to excite the envy of an old driver. The prophecy of my amiable companions turned out true. Luck remained faithful to me, and many a danger which I incurred during my camp life, by chance or by my own fault, turned out as fortunate as this my first attempt to curb a pair of Queensland horses.

Dablke with the Dray and Horses.

CHAPTER III

FIRST CAMPING EXPERIENCE

EARLY next morning I merrily started on my ride into the country. After a cold starlit night, a radiant smiling morning greeted my eyes. Australian winter was at an end, and spring was announcing itself, not, indeed, by the appearance of new leaves on the trees, which, having no periodical change of foliage in Australia, but lose and renew their leaves all the year round. The grass, however, which appears yellowish, shrivelled, and dry during the winter, now begins to thrive anew and to give a vivid colouring to the landscape. The air is wonderfully pure and exhilarating, and the stately eucalyptus trees, with their rich but airy foliage, and their daintily interwoven twigs, are like a picture, drawn by an artist hand on the background of the deep blue sky. The ground is covered with grass as far as the eye can reach, and nothing but the dry beds of the rivers interrupt this monotony by their streaks of yellow sand. On surveying the country and the backs of its mountains from the top of a hill, one seems to see an even forest covering heights and depths, hills and dales. In trying to enter this forest you find that it recedes from your steps. You are indeed surrounded by trees, but they stand so far apart that they do not now give you the impression of a forest, and are in fact never so regarded throughout Australia. It is a typical park landscape. The trees stand at intervals of 30 to 40 feet, and do not suffer any neighbours, not even shrubs, to approach any nearer. Their widespread roots, which reach to a depth of 120 feet or more, monopolise the humidity of the soil to a great extent, thus preventing the growth of any considerable rival. Only grasses or such plants, which do not sink their roots below a superficial depth, thrive within this circle. They remain, moreover, very much exposed to the sun, as the trees of the bush principally belong to the family of Eucalyptus. While the eucalypti are rich in branches and foliage, their leaves are small and hang down vertically,

instead of extending themselves parallel to the ground. In consequence they hardly produce any shade when the sun stands high, which is the case during most of the day. Grasses thrive plentifully under and between the trees, for there is no lack of light, and while their mighty neighbours derive their nourishment from deeper parts of the soil, the humidity of the surface suffices for their wants. This is, however, the case only to a certain degree, for if you kill the trees in a certain circuit, you will find that the grass thrives doubly in that place, and will sustain twice the number of cattle. Taught by this experience, the squatter destroys all the trees growing on his pastures by ring-barking them. This is done in two different ways. Either they remove the bark alone in a ring from 12 to 16 inches wide, about half a man's height above the ground; or else they remove a much narrower strip, which is, however, cut deeper into the sap-wood. The second method is surer and quicker of success and is now mostly adopted. Such ring-barked trees die in four, six, or, at the utmost, eight months. The wood of eucalyptus and acacias being exceedingly tough and resisting, the dead trees remain erect for many a year, till they are at last felled by storms or destroyed by bush fires. There is no sadder sight than a landscape with dead ring-barked trees. Far and wide the tree-spectres will stretch their bare and leafless arms above the grass, which thrives freshly underneath—a token that even the days of the mighty Australian eucalyptus bush are numbered, and that it will sink, a victim to the power of man, in a time not too far distant. At present, indeed, in the Burnett district, comparatively few and small spaces of ground in the neighbourhood of squatters' stations and settlements mark out the beginning destruction. Not rarely one finds interspersed among the lighter "bush" thickets called "scrubs," which are quite as characteristic of Australia as the bush itself. In certain regions near the coast, on the summit of mountains or in damp gullies of North Queensland, we find real tropical primeval forests, which the Australian calls "tropical scrubs." A distinction must, however, be made between the common and the tropical scrub. Their physiognomy is entirely different, and the conditions of their growth are exactly opposite ones.

The *Tropical scrub*, as I have already mentioned, is a real virgin forest, with palms, tree-ferns, ficus, climbing-palms, lianes, orchids, and all the rest. It arises where regular, or at least somewhat regular, rainfalls recur under a tropical or sub-tropical sun. The *Common scrub* is found in regions having the genuine Australian climate, where plentiful rains alternate with periods of drought,

sometimes of several years' duration. It owes its existence to a swampy soil. On entering it during a drought, you will find the ground dry, hard, and full of cracks and gaps, but during damp periods the scene is an entirely different one. Then you will find yourself amid swamps, pools, and little lagoons, the whole soil being far softer and muddier than in the open bush. It seems that layers of an impenetrable material lie below the surface soil in these quarters, preventing the damp from oozing down to greater depths.

This increased humidity of the soil produces a much denser vegetation than the bush itself offers, and consequently there are certain plants adapted to these peculiar conditions, which are only found to develop in the genuine "scrub." These are plants which prefer a considerable humidity for their roots, but will bear to bathe their crown for months and years in an atmosphere poor or entirely devoid of vapour, without being damaged by such a privation. On the Burnett we, in the first place, find certain acacias, which have adapted themselves to these circumstances, foremost of all *Acacia harpophylla*, called "Brigalow" by the colonists, a chief representative of the Queensland scrub. Then we find species of the melaleuca and callistemon, the "tea-trees" of the Australians; *Casuarina glauca*, the scrub-oak, besides species of myrtus and eugenia, the colonists' "myrtle-tree"; *Eremophila Mitchellii*, "sandalwood," and finally, in single specimens, the quaint "bottle-trees," *Sterculia quadrifida*; they owe their name to their trunk, which has a bottle-like swelling between its base and crown. Palms, tree-ferns, climbing-palms, and other lianes, orchids and other epiphytes are entirely wanting. Thickets of a vegetation, which we generally call a tropical one, are found in Australia in the same latitudes, but only in places that combine a considerable moistness of soil and humidity of air. They develop in certain regions along the coast, in damp gorges and around the summits of higher mountains, even if these be situated further inland. I shall have to speak of these tropical forests of Australia further on.

Most of the trees, which form the typical scrub, are of a medium height, but the bottle-trees, however, sometimes attain enormous dimensions. Real underwood is only to be found near the verge of the scrub, nor is there any moss. The ground is mostly perfectly naked. Here and there a lighter space allows some grass to thrive, but neither mosses nor lichens beset the trunks of the trees. A special characteristic of the scrub, however, are the numerous dead trunks covering the ground in all stages of decay.

Violent rains which loosen the ground cause the fall of many trees. The prevalent dryness of the atmosphere prevents them, however, from rotting and falling to pieces attacked by parasitic plants and hostile animals, and causes the dead wood to dry up by slow degrees. The same occurs with dead trees in the open bush.

As may be imagined, the Brigalow scrub, with its dark evergreen foliage, its naked trunks, its bare ground strewn with dead wood, offers a dreary and somewhat sad picture to the traveller. To enter it is troublesome, but not by far so difficult as crossing a real tropical virgin forest. On horseback, however, it is absolutely impossible to pass through one of the denser scrubs, the fallen trees forming dangerous, sometimes insurmountable, obstacles to the horse's legs.

Worse than the brigalow and tea-tree scrubs¹ of Queensland are the "Mallee scrubs" and "Mulga scrubs" that cover immense stretches of ground in the southern parts of Australia, and are the worst foe of the traveller. The mallee scrub consists entirely of a dwarf-like species of eucalyptus, the *Eucalyptus dumosa* or "mallee," the trunks of which grow as closely together as reeds or bamboos. They begin to branch out about 12 to 15 feet above the ground. One has to fight one's way through these thickets with hatchet and axe, a huge piece of work considering their extent. Of lesser dimensions but still greater denseness are the mulga scrubs, which are principally formed by dwarf acacias (*Acacia aneura*). These trees are armed with such mighty thorns, and form such densely interwoven hedges that it is impossible to penetrate them.

Owing to periodical floods, the Burnett and its tributaries have cut deep beds into the country, which are mostly, however, without any water. These waterless river beds offer in many respects similar conditions for the vegetation as the scrub; ample humidity of ground combined with aridity of air. In consequence we see a similar vegetation arise. Thick groups of "tea-trees" and "river-oaks" thrive on the sparkling white sands of the river-bed. When there is a flood, nothing but the crowns of the trees will be seen above the surface. Then the ground, in which their roots are anchored, will get undermined by the river, which is soon covered with quantities of disrooted trees. These are carried on by the torrent, and act like levers on the river banks, their force aiding to deepen and widen the river-bed.

¹ The "tea-tree," which I frequently have occasion to mention in these pages, has nothing in common with the well-known *tea plant*. The name of the Australian tree is sometimes, I have been told, spelt "Ti-tree," and is perhaps of native origin.

While the tea-trees and river-oaks prefer the bottom of the river-bed, the height of its banks are studded with eucalypti, especially with "blue gums," which are characterised by their milk-white bark.

In the more southern parts of Australia, *Eucalyptus globulus*, the species we have begun to grow in Europe, is termed "blue gum." On the Burnett this species is replaced by a nearly related one (*Eucalyptus tereticornis*?). The blue gums reach an

Forest of Eucalyptus trees.

immense height, and the dwarfish specimens of these trees, which we find in Italy, do not give any impression of the stately and proud character of their Australian parents. Under favourable conditions *Eucalyptus globulus* will reach a height of about 360 feet; and specimens 200 feet high, and 12 to 15 feet in circumference are not rarely seen. Still greater dimensions are reached by *Eucalyptus colossea* of West Australia, and a specimen of *Eucalyptus amygdalina* in Dandenong Mountains, near Melbourne, measured 480 feet in height, thus overtopping even the celebrated mammoth trees, *Wellingtonia gigantea* (370 feet) of Yosemite Valley, the Strasburg

Cathedral, Saint Peter's, and the Cheops Pyramids, and equalling in height the Cologne Cathedral.

If, on riding through the bush, the traveller sees the white bark of the blue gums shimmering through the trees, he at once knows that he is approaching a water-course. The blue gum also, however, loves to reside in the neighbourhood of swamps, lagoons, and lakes, where no scrub has developed. To all appearance this species of eucalyptus demands a moister soil than its relatives, for one very rarely finds it growing in places devoid of water.

My way at first followed the road leading to the little mining town of Eidsvold, about sixty-five miles up the river from Gayndah. The "main road" of these parts is no product of engineering skill. It owes its existence to the wheels of the coaches, carts, and drays, which are the means of the scarce traffic between two settlements, and imprint their track on the ground by regularly following the same course. Nothing is simpler than making a road in Australia. A surveyor, aided by several colonists familiar with the country, fixes the shortest route accessible for vehicles, and marks it by cutting the trees. All the rest is left to the traffic itself. The construction of a bridge is a thing undreamed of. The rivers are simply crossed at convenient fords; but, of course, this becomes difficult when they swell, and quite impossible as soon as a flood sets in. Then all communication stops for weeks, sometimes for months at a time. Obstacles of the ground are generally passed round instead of being removed, so that in time the road describes a circuit round fallen trees or broken ground. Only much-frequented roads are considered deserving of a more scientific treatment, which consists in levelling any particularly rough ascent, laying logs along very swampy parts, and clearing away some shrubs where the way leads through thickets. Settlements like Gayndah send out a so-called "road party" from time to time, to examine the roads and to repair the worst damages done by rains, floods, and landslips in the course of one or two years. I was always particularly interested in seeing highroads in such low stages of development, so to say, in an embryonic state. This is a stage unknown in European roads, where they enter upon existence cut and dried, a definite well-constructed product of art.

I expected to reach my dray before sunset, in about the spot whence we had to leave the road and to set out on our way through the pathless bush. Great was my astonishment when, after barely two hours' ride, I saw Dahlke come towards me with his horses and the empty dray. On the evening before he had reached the spot where the Aranbanga Creek, commonly called Deep Creek, is usually

crossed, and had undertaken to pass the rather swollen creek, in order to camp on its opposite bank. He got down the river-side all right, and also managed to get through the stream, the waters of which reached the horses' breasts, without any mishap. On climbing the opposite bank, however, which was steep and slippery, one of the leaders had slipped and pulled the other horses down in falling. Within a hair's breadth the dray and its team of four would have sunk back into the river. Luckily, the joint efforts of Dahlke and Frank to quiet the other horses and to raise the fallen one were crowned by success. The pole of the dray, however, was broken, and the latter was thus rendered unfit for transporting the heavy luggage. So Dahlke and Frank had to unharness the horses and to unload the dray, Frank intending to stay with the luggage and Dahlke to return to Gayndah with the empty dray, there to have it repaired, and for the meantime to borrow another.

This beginning of my expedition was not very auspicious. Still, I had to be grateful that no worse damage had been done, and that my luggage had not suffered. All the harm resulting from the accident was the breaking of a pole, and, what was worse, a two days' loss of time. I wished Dahlke, who was rather loath to have to turn back, good speed, and continued my ride. In several places along the road I noticed quantities of the quaint Australian "grass-tree" *Xanthorrhoea*, which carries on the top of its high, strong, and straight trunk a voluminous tuft of coarse grass-like leaves. The blossom is a mighty spadix shooting out from amidst this bunch.

Towards noon I arrived at the fatal spot, where I found Frank sitting like a black Marius amid the ruins of my luggage, which was strewn far and wide along the river bank. I settled down as well as I could for a stay of several days, brought all the luggage up the left river-side, collecting it into a big heap, which we covered against rain and dew with our tarpaulin.

In this work we were aided by a carrier called Corry, who was on the way from Gayndah to the squatter station Cooranga, with a waggon drawn by eight oxen, and who camped close by. He had all his family, wife and four small children, with him. On the evening before, having just passed the creek himself quite smoothly, he had witnessed the mishap of my dray, and had given help to my men in their difficulties. During the night he suddenly appeared at Dahlke's side, begging him for something strengthening for his sick and feverish wife, if possible some rum or brandy. Now there were, in fact, several bottles of rum amongst my luggage, an article I had taken with me on purpose to be able to reward my

blacks for particularly good work and behaviour by a good "nip" here and there. This had been the advice of my Gayndah friends, who declared a little "nip" to be the best spur for the lazy blacks. Good-natured Dahlke, who was no eminent judge of human nature, had given the fond husband a full bottle of rum, bidding him take out a portion of the precious stimulant for his wife and return the rest. The bottle and its contents, however, were never seen again. Instead, Mr. Corry showed unmistakable signs of having made use of the medicine on himself, while his wife was seen all day busying herself about all sorts of work in a perfectly brisk and healthy fashion, entirely unlike a fever patient.

This was the beginning of my acquaintance with the Corry family. My relations to the worthy mother of my rum-loving friend, Mrs. Catherine Corry, were of a character less amicable. The old lady lived in a miserable roadside inn between Gayndah and Eidsvold, near Mundubbera, an off-station of Coonambula, and was known as not very scrupulous either in regard to business matters or in the point of the cleanliness of her house and kitchen. The P.M. of Gayndah, Mr. W. R. O. Hill, had taken the precaution to give me a letter for the worthy dame, forbidding her most strictly to sell spirits of any kind to my blacks. The sale of spirits to the blacks is prohibited and liable to punishment in the whole of Queensland. But my Gayndah friends were good judges of the human heart, and seemed convinced that Mother Corry, a woman above prejudice, would snap her fingers at law, supposing that the blacks did not come empty-handed. Their prophecy proved but too true!

The sky being clear and unclouded, with no signs of rain, I did not pitch any tent, but slept in the open air. Having brought some bread and some ready-boiled meat from Gayndah, I had only to prepare some tea, and so terminated my first rather ominous day in the Bush with a hearty meal. The night was chilly, and I felt uncomfortable in spite of my blankets, the cold making itself felt from below, through the linen of my stretcher. A couch of this sort is easily prepared by stretching a sack between two poles, which are supported by two pairs of crossed logs of wood. Every one who has to camp out for some time manages in this way, it being very unhealthy, particularly during the cool season, to sleep night after night on the bare ground. These precautions are not necessary on short tours, where one will simply lie down on a sack or on a rug spread over the earth.

On the next day I rambled through the surroundings and was surprised to see the quantity of tracks and traces left by the

marsupials on the ground and trees, and the multitude of birds peopling these scanty woods. Frank soon taught me to know the traces of the different marsupials, and I soon perceived one of the biggest of the Phalangeidæ, *Phascolarctus cinereus*, the "native bear" of the colonists, sitting on the top of a big eucalyptus. It is a clumsy creature, about the size of the well-known American Racoon

Pouched Bear (*Phascolarctus cinereus*)

but of a much heavier build, remarkable for the stunted growth of its tail. This distinguishes it from most other marsupials, and is particularly surprising in an animal living on trees. But on watching its slow and cautious movements, on observing that in climbing it always follows the main road—that is to say the growth of the branches, to which it clings by its sharp and strong claws,—without ever trying to jump from one spot to another you will clearly see that it does not miss the tail by means of which other arboreal animals balance and swing themselves along from branch to branch.

In the way of movement *Phascolarctus* reminded me very much of the tree-sloths, but there is no anatomical relationship whatever between it and the bears, racoons, and sloths. *Phascolarctus* is a genuine marsupial like the Kangaroo and the Bandicoot, though so little resembling its kindred.

My shot wounded the creature. In falling it succeeded in clutching a strong bough, and so supported itself. Thus it hung for some time suspended by its fore-paws, and trying in vain to draw up its hind-paws, and so swing itself on to the branch. As I expected it to fall any moment, I did not fire another shot. On Frank's telling me, however, how tough and strong these animals are, and that they are able to cling for hours to a tree in this wounded state, I aimed once more, and struck its head and left forefoot. Still it clung to the tree for a while with its right fore-paw, then fell down heavily, and died a few minutes later. It was a strong fully-developed female, carrying a half-grown young one on its back. The poor little thing clung to its dead mother with its sharp paws, and would not be torn away. I thought of taking it into my camp and rearing it, but the next morning it had left its mother's cold body and disappeared.

In the afternoon Dahlke returned with a borrowed dray and the horses. The crossing of the creek with the empty dray proved a very simple affair. My goods and chattels were soon packed once more, and when we settled to sleep that night everything was ready for an early start next day.

My plan was this day to follow the road to the vicinity of Mundubbera, an out-station of the large run of Coonambula. Thence we wanted to cross the bush in a southern direction till we should reach the Boyne. Between Mundubbera and Deep Creek there lay two pretty steep ridges, rather tough work with my heavily loaded dray. I rode on in advance of it for the purpose of paying a visit to the inn of Mrs. Corry, with whom I intended to have a private conversation, in order to prohibit the sale of liquors to my blacks. The old lady indignantly repelled the imputation of similar misdeeds. I had my own doubts as to the sincerity of her indignation, but kept the mandate of the police magistrate in my pocket for the time, with the view to its later use as a trump if necessary. The inn looked so uninviting that I chose to return to my dray instead of lunching there. After two o'clock I met Dahlke and Frank hard at work performing the ascent of the second ridge. The horses, fresh from a six months' freedom on the pastures, were badly suited for rough labour of this kind after their long idleness. After great exertions we reached the summit, where we rested for a short time

and took a hurried meal. At our feet lay a hilly wooded landscape, eucalyptus trees covering the country on all sides. To the west we saw the valleys of the Burnett and its affluents; to the south those of its important tributary, the Boyne, and its vassals. The country lying at my feet was to be my field of action during the year to come. Definite were the scientific problems, the solution of which I sought among these hills and dales, problems of interest not to myself alone, but to many naturalists in far-off America and Europe. My joy in having such a fine task before me was held in check by some doubts and fears, lest the result should not equal my expectations. But I thrust from me these doubts. The principal thing now was to grasp the present moment and the chances it offered. On taking leave of this landscape, fourteen months later from this very same mountain top, I felt as if parting from an old friend who had amply rewarded my confidence, and whose features would never be forgotten by me.

After darkness had set in we reached the spot near Mundubbera, where our way separated from the road, and where we intended to camp for the night. We had just halted, unharnessed our horses, hobbled their forefeet and left them to feed on the grass, and had lit a fire to make some tea, when suddenly we were startled by a cheer, and surprised by two horsemen coming galloping towards us from out of the bush. They were two of the blacks whom Frank had engaged for me, and had come to meet us on purpose to show us the way to that point on the Boyne which they considered best adapted for our first camp. Both were well-grown, sturdy men, with curly black hair and rough black beards, clad in shirt and trousers, their horses a pair of superannuated jades, which they had once received as wages for work done at some squatter station. One of the men, called Garry by the whites, was the happy possessor of an old Winchester rifle, which he handled quite cleverly. Both declared their own and their friends' readiness to enter my service, and promised to catch and shoot as many *Echidnas*, *Ornithorhynchus*, and marsupials for me as I could possibly desire.

This night was still colder than the last. On waking at day-break I noticed a droll little creature jumping about the branches of the eucalyptus tree under which I had been sleeping. Its quick movements and long bushy tail reminded me of a squirrel. For a long time I watched the little thing without moving. At last it left my tree and ran towards its next neighbour a hundred steps off. I now jumped up and cut off its course, forcing it to run back to the first tree. This was rather a low one, thin of foliage, and without

any holes which might have offered shelter to the poor little beast. Anxiously it jumped about among the branches, not daring to try another escape on the level ground. My shot brought it down, and it proved to be a fine male specimen of *Phascologale penicillata*, called a "bush rat" by the Australians, a marsupial closely related to the carnivorous and insectivorous *Dasyurus*, while the shape of its head reminded me of a shrew mouse. This animal makes itself an unwelcome guest to the human settlements in the bush, just like its

Bush Rat (*Phascologale penicillata*).

little relative *Sminthopsis crassicaudata*, the "pouched mouse" of the settler, and like the less frequent *Antechinomys laniger*. While the pouched mouse does no real harm, but only disturbs one at night by rustling about, the bigger and stronger bush rat is a pursuer of poultry, and very much abhorred on account of its rapacity and bloodthirstiness.

I now left my dray once more, and rode directly to the squatter station Cooranga, with Garry as a guide, while Dahlke and the others took the dray to the place chosen for our camp. Twice on our way we met little herds of kangaroos, and each time Garry killed an animal by a good shot. One of them was a strong female,

with a newly-born, little developed, and half-transparent young one in its pouch. Less successful was he in trying his skill on one of the wild ducks, which people the little pools and ponds and the surface of the rivers.

Towards dinner-time we reached Cooranga, a station on the right bank of the Boyne. Mr. F. A. B. Turner, the manager of the station, received me most amicably, allowing me to camp and to shoot on his grounds at my pleasure. Of course anybody has the right to cross the country in any direction, to camp, and even to settle for a considerable time anywhere. Foremost of all the prospector, that is to say, any one going about the place with spade and axe, and pretending to seek for precious metal, enjoys the utmost privileges in that direction. Wherever a road crosses the country, any one is allowed to camp a hundred steps to its right or left, and there are so-called "reserves" on all the large stations, spots where camping is allowed to any stranger. When gold is found on any run, the Government has the right to take possession of the spot and its surroundings on the petition of the finder himself or of any one intending to work a mine there. The place is then divided into districts of a certain extent, and handed over to the gold-diggers to turn it to advantage, at which proceeding the original finder of the gold naturally enjoys certain privileges. On the other hand, every squatter has, of course, the right to drive away anybody not entitled to settle down on his run, particularly if he suspects the latter of supplying his wants in beef from among his cattle. If a settler intends seriously to settle down on a run, he is allowed to apply for a certain piece of the country, provided part of the run has been gazetted open to selection. He then receives this piece of land as a "selection," being at the same time bound to fence it in. The Government favours this settling of small farmers, and, indeed, it seems to afford the best means of converting the country by degrees from a pasture-land into a corn-growing territory.

As I have already remarked, Mr. Turner did not object to my shooting and camping on Cooranga. Indeed he was doubtful whether the place I had chosen for my camp, the situation of which I was not able to describe to him precisely, only knowing it from the description of the blacks, belonged to Cooranga or to Coonambula. After his having kindly promised to pay me a visit at my camp, I left Cooranga and rode down along the river for about seven miles, to where it is joined by Coocher's Creek, a tributary then nearly waterless. We crossed the creek, and discovering, some distance down the river, a white tent gleaming through the trees, we

made it out to be our own camp, which Dahlke, who had arrived an hour before, was in the act of pitching. He had chosen for the camp a little mound near a dead arm of the river, and about 130 feet above the present river surface, so that we were safe in case of a flood. There were good pastures for our horses all round, and some miles east of the Boyne there was a dense scrub, which the blacks thought suited to the search for *Echidna*. They had set up their camp at about a mile from my own, as I wished, for various reasons, to keep them at a certain distance. It was quite dark by the time I went to see them, and the camp fires, burning here and there, threw a fitful light on the shapes of the men, women, and children. On my approaching their camp, there arose a chorus of howls from all the savage dogs which they keep to accompany and help them on their hunting rambles. My sudden appearance seemed very much to irritate these beasts, they at once flew at me, and a pair of the biggest seemed very much inclined to try their strength on my person, a rare incident, for in general these dogs are cowards, and not given to attacking men of their own accord. Now the women at once began to scream at the dogs, while the men threw logs and firebrands at them and one of the blacks quickly gave me a strong stick to keep the creatures at a distance. All this tumult, the strange cries and shouts of the blacks, the howling of the dogs, the peculiar surroundings, lit up by the fitful firelight, made up a weird fantastic scene, not easily to be forgotten. At last the dogs were pacified, and only kept snarling at me from a safe distance.

This camp numbered about thirty inhabitants: men, women, and children, who belonged to eight different families. Each group had settled down by itself at some distance from the others, so that the camp covered an extensive space of ground, the widely dispersed camp-fires adding to the impression of a far greater assembly. Only two of the families possessed tents—and very old and tattered they were—which they had once purchased from some white men. The others built themselves huts by means of some big pieces of bark supported by sticks, which they stuck into the ground in a slanting position, this primitive edifice having to protect them from rain, dew, and cold. This toy-house had its back turned to the prevailing wind, while the fireplace was established before its entrance. In case the wind changed to another quarter, driving smoke or rain into the hut, a few moments sufficed to turn the fragile habitation round on its axis and away from the wind, an operation which was executed with magical celerity.

The blacks seemed very much flattered by my visit, they eagerly promised to hunt for me and to begin work by the morrow. So with a light heart and full of glad expectations I returned to my own camp and settled for the night in my newly-erected sleeping-tent.

This night was still colder than the last, and I was often awakened by a chill, when the blanket covering my limbs was tossed off by me in my sleep, leaving parts of my body exposed to the severity of the night air. In the morning all the grass around was covered with frost, but at eight o'clock the temperature was agreeable once more, and at mid-day we had 78° in the shadow of my tent. Some of the blacks had fulfilled their promise and set out *Echidna* hunting.

I meanwhile completed the arrangement of my camp. I had two little tents for myself, one as a sleeping and sitting-room, the other as a laboratory. Dahlke had constructed a sort of tent for himself by means of our tarpaulin, and in this we also deposited our stores and tools. The tents used in Australia consist of thin linen, and form small rectangular abodes with slanting roofs. The entrance to them is on their narrow side. The whole tent weighs but a few pounds, since a traveller does not generally carry the tent-poles along with him, but erects a new frame each time, out of some freshly-cut young trees. Practised hands can fell the necessary trees, set up the framework, and pitch the tent in less than an hour. Such a tent, however, does not afford sufficient protection against the sun, and still less against violent or continued rains, the kinds of linen used not being waterproof. A real protection is, however, attained by stretching a simple linen cover, a so-called "fly," which is not waterproof either in itself, at some distance above the roof of the tent. This "fly" is somewhat bigger than the original roof. It withstands even the most violent shower, and though the linen be perfectly soaked, the water will drip off it instead of oozing through. Nothing but a fine spray, and this only when the rain is very violent, will fall from the inner side of the "fly" on to the roof of the tent, just enough to moisten but not to penetrate it. During some weeks of heavy and violent rains, which I had to undergo in November, my tents sheltered me perfectly, although round about me everything was turned into a morass. It would have required a particularly dense, solid, and consequently heavy, waterproof tent to withstand these severe rains without our "fly," and I consider the Australian tent a great improvement upon those generally used, and satisfactory with regard to cheapness and lightness.

Tables and chairs are quickly made by nailing some boards

The Blacks in front of my Tents.

from the chests or some pieces of bark to poles which are driven into the ground. The fireplace is protected from the rain by a roof of brushwood or of bark. A few fresh logs of wood, thick and heavy, serve as a basis to the fire and keep glowing by day and by night, furnishing the camp with hot embers, one of the most important requisites at any time.

My camp life was in general a very regular one, every hour of the day having its fixed work and its fixed claims on me. The early mornings, from an hour before till an hour after sunrise, were dedicated to the hunt of *Ornithorhynchus* (also called Platypus, Duck-bill, or Water-mole by the colonists).

Ornithorhynchus anatinus is only represented by this single

Duck-billed Platypus (*Ornithorhynchus anatinus*).

Australian species, and exists nowhere else in the world. It does not live in all parts of Australia, but is only to be found in the southern and eastern parts of that continent, as far as the 18th degree of south latitude, and in Tasmania. The banks of the water-courses, in which it finds its living, for it is an aquatic animal like the beaver and the vole, are its dwelling. For its food it is restricted to the water, and is able to keep under the surface for some time, but not to breathe there, its lungs being as unfit for water-breathing as those of all other mammals. During the day it generally remains asleep in its self-built holes within the river-banks. These burrows have one entrance above and one below the water, uniting in a tube of 20 to 50 feet, which leads slantingly upwards from the river-surface and ends in a little cave. I have never found burrows with a greater number of tubes labyrinthically entwined, and believe that their existence may be regarded as exceptional.

I soon found out the best method of hunting the animal. I used to get up before daybreak and search such parts of the river as appeared a suitable hunting-ground for Platypus, for these animals only feel safe in those broad and deep parts of the river, where they can disappear to the eye when they dive, and where the water flows slowly, harbouring a rich animal and vegetable world in its depths.

During the Australian winter, from June till the end of August, when the nights are cold, you may be sure to find the animals in the river at sunrise and sunset. If you are near the river early enough to watch the rising of the sun, you will see something flat, one or two feet in length, floating on the water like a plank, as soon as the first sunbeams strike the river surface and allow you to discern single objects. Sometimes it lies motionless for a while, then it disappears, to reappear again after some minutes in quite a different place. This is an *Ornithorhynchus* seeking its breakfast in the mire of the river. With its flat duck-like beak it rakes up the mud for grubs, worms, snails, and most of all mussels. It does not instantly devour its prey, but prefers stowing it away in its capacious cheek-pouches. Only when these are filled, will it begin to chew and swallow the food above the surface, so that, when you see it drifting along the water, you know that it is having its meal. *Ornithorhynchus* is toothless as well as *Echidna*, but it is clear that this condition is no original characteristic of oviparous mammals. The simpler organised vertebrates, fishes, amphibia, and reptiles, being endowed with teeth, there can be no doubt that the absence of these organs in the higher class of animals is but a secondary phenomenon. The same remark may be made of birds, fossil researches having made us acquainted with ancestral species, which were supplied with teeth. It can likewise be proved that *Ornithorhynchus* descends from animals furnished with teeth, since the young ones have shallow, tuberculated teeth in their upper and lower jaws, twelve in all, and closely resembling the teeth of certain very primitive fossil mammals, the multituberculates. These teeth soon decay and then fall out, making room for horny thickenings of the edges of the jaws. During my stay on the Burnett, I frequently noticed that the principal food of this animal consisted of a hard-shelled mussel (*Corbicula nepeanensis*, Lesson), which I often found stored up in great quantities in its cheeks. Teeth are very bad and brittle tools for grinding such food. Horny jaws are a far better instrument for cracking hard "nuts" of this kind, and so it is probable that the want of teeth and their peculiar substitute may be associated with the character of *Ornithorhynchus*'s favourite food.

When the Platypus drifts along the surface of the river, it is able to watch everything going on above the bank with its small eyes, deeply as they seem imbedded in its fur. The animal's hearing is just as sharp, and the faintest noise suffices to awaken the suspicion of the shy little thing and to drive it away. Therefore it is in vain to steal up to it during its stay on the surface. You have to stand like a statue till it dives, then to jump forward towards the spot where it has disappeared ; as soon as it reappears you have to stand stock still once more, and so on till you come within shooting distance. Once startled, the Platypus is sure to disappear for that day. After having determined these facts, I hardly ever missed a platypus, though its chase is considered a difficult one by the colonists.

It is also generally believed that the animal is pertinacious of life and hard to kill, but this too I have found to be an error. A good shot will kill it instantly, even if hitting only the body and not the head. The contrary opinion can only have arisen by people shooting the animal in the moment of its diving, and therefore missing their mark. As I wanted to have a collection of well-preserved brains, I never aimed at the head but always at the body of the creature, and only used small shot. As a rule, I nevertheless bagged my game. The animals were mostly killed by the charge. When a few sparks of life remained, they invariably sought to escape by entering their burrow from the water side. I never saw them try to retreat by the upper entrance. When they are severely wounded their efforts to dive are in vain, as their bodies are of far lighter specific gravity than the water, and diving requires a great expenditure of force. I often heard the wounded animal break into a dull groan. Bennett, who kept several specimens imprisoned during a long space of time and closely watched them, tells us of the grunting, growling, squeaking, and piping noises they used to utter when playing or making signals to each other.

I also tried to catch the animals with snares, as I heard that this method has succeeded in several cases. The snares are laid before the land entrance of the burrow and the animal caught on leaving or entering its home. I had no success with this method, as I believe, for two reasons ; firstly, the water entrance seems to me that chiefly used as a doorway by the animal, the upper aperture serving principally as a ventilator and only rarely for egress ; secondly, it is difficult to avoid laying snares before kennels which have long been deserted. *Ornithorhynchus* likes the upper entrance of its hole to be situated at a certain height above the level of the water,

and whenever the river rises very high or falls very low, and the burrow no longer pleases the animal, it forsakes its old home and founds a new one. This may happen several times during one year, and therefore one generally finds in haunts frequented by *Ornithorhynchus* a large number of deserted dens near those inhabited. The land entrance being rarely used, it is difficult to discern whether a burrow is inhabited or not, and so it is very probable that, as before remarked, I often laid my snares before holes long deserted.

At Gayndah I had caught a considerable quantity of *Platypus* during my short stay, and I had pretty good luck in this sport also at the beginning of my camp life. Luck, however, soon began to forsake me in proportion to the warmer temperature of the nights. As long as the nights were cold, one could see the animals swim about seeking food till daytime. As it grew warmer this ceased entirely. Even at dawn and after sunset they grew rare, and during the hot season I hardly ever succeeded in finding and shooting any at all. The same coincidence struck me on returning to the Burnett in June 1892, where I stayed till the end of October. It seems to me that during the warmer season the animals exclusively use the night for their visits to the river, and sleep in their burrows during daytime. My blacks were hardly able to furnish me with any information as to the customs of this animal, which they called "Jungjimore," for they despise its flesh and consequently never hunt it. In fact, it has an "ancient and fish-like" smell, even after it has been skinned. The blacks showed utter contempt for "Jungjimore," and could hardly be brought to help me in digging up their burrows or to trouble themselves in any way about this, to their minds, useless and inferior creature. Their taste for *Echidna* is quite the reverse, since their regard for it amounts almost to adoration, and they consider its flesh a first-rate dainty, superior even to beef, which is the greatest compliment they can pay to any food. According to Bennett, the blacks near the Wollondilly and Yas rivers in New South Wales have a different taste, and are very partial to *Ornithorhynchus*.

The white colonists leave *Platypus* unmolested, though its fur is nice and dense, remindful of mole-skin, but longer haired. Fur is, however, not much in request in so warm a country as Queensland, and even in the cooler southern colonies the *Platypus* is rarely pursued, its chase proving too difficult and unprofitable, and its skin too small to form a lucrative article of trade. I, for my part, made quite a harvest out of the fine little skins, since I did not always prepare the entire animals, but their separate organs, examining their brains and drying their skeletons. I was thus able to take home with me

a quantity of skins, which, made into caps, form a nice keepsake from the antipodes for myself and several friends.

During the first week of my camping out the chase was very abundant, and the zeal of my blacks quite satisfactory. In the first place, it was the novelty of the thing which tempted them. And secondly, inexperienced as I was in dealing with these people I had made them certain promises which looked very lovely in their eyes, but proved impracticable later on. I had told them that I would pay them cash at the end of each week, having no idea that the possession of ready money might prove a temptation for them in this out-of-the-way place. Every female *Echidna* was to be worth a half-crown, the male animal sixpence. Every marsupial had its fixed price as well. The diligent worker and bringer of many animals was to have a nip as an extra reward in the evening. Besides, hoping to spur their zeal to the utmost, I promised a premium of £1 to the person who would have brought me the most valuable and numerous specimens at the end of our common labours. For other animals, birds, reptiles, frogs, and insects I paid nothing, or at least nothing worth mentioning, since I soon found that the blacks would bring me all sorts of rubbish instead of the objects I wanted, if I did not make the difference clear to them in this way.

All this brought about a very lively competition during the first week. I received material in such abundance that I had difficulty in finishing its preparation during the day, in dissecting the animals brought to me, conserving their organs, eggs, and young, and preparing them for a more thorough examination, which was to take place in Europe. On 10th September I received no less than eight female *Echidnas*, two of which bore eggs in their oviduct, whilst two of them carried eggs, and three others young ones in their pouch. Besides this, I received a quantity of marsupials on the same day. On settling my accounts on Saturday the 12th of September, I found that every black had to receive a considerable sum, the lion's share being due to old Jimmy, who also subsequently proved my best and most trustworthy assistant. In the course of this week he alone had brought me six female *Echidnas*, four so-called Opossums (*Trichosurus vulpecula*), one Bandicoot (*Perameles obesula*), and several other smaller animals. After deducting the rations of flour, tea, sugar, and tobacco, with which I had furnished him from my provisions, there remained still 11s. which I, inexperienced as I was, entrusted to his hands unsuspectingly. Proportionately, all the other blacks received their due share of wages, and I began to consider whether my means would suffice if things went on in

this style. On Saturday evening all the blacks got a nip as a reward for their services, Jimmy, the victor in the contest, receiving an extra glass. All was peace and harmony, and my blacks, satisfaction gleaming in their looks, retired to their own camp, where I saw their figures move about till late into the night, chatting, laughing, and singing among their camp-fires.

Thus I had every reason to be contented with the results of this week. I had myself obtained some stages of development of *Ornithorhynchus*, and had received several specimens of younger and older eggs of *Echidna*, and some young of this animal, by help of the blacks. The marsupials examined by me all contained fairly developed young ones in their pouches, but none of those early embryonic stages particularly valuable to the anatomist. By this I saw that I had come too late for the study of these animals, a circumstance of small weight compared to my success with regard to the more important oviparous mammals. I also found out that the rutting time of the "native bear," *Phascolarctus cinereus*, was approaching, so that there was hope of my obtaining an embryological series of this animal at least. Eggs of the lung-fish *Ceratodus* had not been found by us as yet. We had not, however, thus far seriously tried to search for them, Frank having assured me that to do so would be in vain on account of the muddiness of the swollen rivers, while he had promised me most positively to obtain some as soon as the rivers should have fallen and their water cleared. I lent too ready an ear to this braggart, who, as I found out later, played rather a fool's part among his tribe.

The next day was devoted to rest, so I set out for Coonambula to pay a visit to Mr. M'Cord, the proprietor of this extensive run, and to ask him for his permission to camp and hunt on his grounds. Having never been in Coonambula before, and having to ride without any path most of the way, I was rather curious myself how I should manage to reach this station. It is considered quite a natural thing in Australia to find your way without any road whatever to places, the situation of which is only known to you in a vague sort of way, both as to distance and direction. Nobody ever thinks of using a compass, since the position of the sun, which is nearly always visible in the clear and cloudless sky, enables the traveller at any time to make sure of the quarters of the heavens. He has, of course, to take into account the sun's reversed position on the southern hemisphere, and to get used to seeing him to the north at noon, while he has to pay attention to the course of the rivers and the direction of the mountain ranges. In this way an ex-

perienced bushman makes himself at home in strange parts, as well as the European does by help of the highroads and sign-posts of his civilised country.

Not being at all sure of myself at that time, I took a round-about way over Mundubbera, whence a sort of road leads to Coonambula. This road is no better than a track, formed by carriages and carts, and hardly visible in some places, particularly so where it crosses the river, the bed, and consequently the crossings, of which are liable to changes during every flood. Crossing the rivers on horseback does not present any difficulty, and a rider will manage this even during a flood, swimming being inborn with most horses, whereas passing the swollen rivers with vehicles is a matter of impossibility. Even in times of low water, carriages and carts have great difficulty, not so much in crossing the river as in ascending its steep banks. During high floods the carriage traffic comes to a full stop, and when the rivers become swollen and rapid, even the possibility of crossing them on horseback ceases, and it then happens that some of the inner districts, Coonambula for instance, are for a time quite cut off from the outer world.

Above Mundubbera, the Burnett describes a mighty bend to the south, and this can be cut off by riding in its base and crossing the river twice. After the second crossing signs of human activity break upon the view wherever you look. A few hundred yards from the river there commences an extensive paddock, which is entered by a wooden gate. This is about two miles in diameter, and has been erected in order to separate cattle, horse, and sheep from those which pasture freely in the Bush without a fence of any sort. A certain number of horses have also to be kept in the neighbourhood for the use of the station, and the paddocks further serve to set apart places with particularly good pasture for fattening the cattle for sale. These are but a few of the manifold uses to which paddocks are put. Within those paddocks, which are destined for the improvement of the grass, the trees have been ring-barked and killed, but though this process is most useful, its outcome can hardly be considered an improvement to the picturesqueness of the landscape. After having traversed the paddock, one leaves it by another gate. The gates are so arranged as to enable one to open them from horseback, provided the animal be not too wild.

Here the view opens on a little grass-grown flat, devoid of trees. The picture is bounded by the steep right bank of St. John's Creek, on the left and more sloping bank of which the station itself is situated. Its buildings are scattered over the plain in a wide

circuit. There you see the cheerful manor-house covered with creeping vines, midst its garden of roses, peach and orange-trees. There are the storehouses for provisions, the shed and coach-house, the house for the "stockmen," the blacksmith's shop, the wool-shed, and finally, close by the creek, the hut in which the farm hands keep house. All these edifices have been built by the proprietor and his men ; they are constructed of wood and covered with galvanised iron, which is employed in all Australian settlements. Wooden roofs would indeed be just as cheap, and would furnish a cooler covering than galvanised iron, had not this latter the advantage of keeping the fallen rain pure and unsullied, and of letting it run off in a simple manner into the iron tanks, where it is kept for times of need. This water forms a much nicer and more wholesome drink than that of the rivers, which is apt to have a nasty taste, and to disappear entirely in seasons of drought. Therefore great excitement prevails whenever it happens that the tanks are empty, and the household must have recourse to the less agreeable river-water for cooking and washing.

It will be remembered that I had met Mr. M'Cord, the proprietor of Coonambula, at Brisbane, where his brother-in-law, Mr. Parry Okeden, the Under-Colonial Secretary, had introduced me to him. Mr. M'Cord, an Irishman by birth, has lived in Australia for the last thirty years, and he and his family have lived at Coonambula for a long time. Although I was an entire stranger to him, he received me in the kindest and most cordial manner, and to his help and active friendship I owe a great part of my success in those distant regions. The hospitality I enjoyed in his ever-open house threw brightness into my Australian life, which, in spite of all the scientific and aesthetic interests it offered, lacked many of those things which render existence so enjoyable at home, and which we sorely miss when obliged to do without them ; above all, the intercourse and conversation with pleasant and refined persons.

The house which the family inhabited was rather modest from the outside. Inside, however, it was full of that comfort with which every Briton knows how to furnish his home, wherever life may have cast him. A more handsome house, which had been newly built and had only been inhabited for a short time, was totally burnt down, thus forcing the family to move back to its old abode.

Coonambula may be considered a typical example of an Australian run. It is of middling size, covering an area of about 30 square miles, and, besides it, Mr. M'Cord possesses another run

of about the same dimensions, Cania, near the source of the Burnett. In the northern and western parts of Queensland we find considerably larger stations of 400 to 600 square miles, exceeding in size some of our German principalities. In Coonambula and Cania combined there are about 20,000 head of cattle, and 500 to 600 horses. The stock of sheep is smaller, the pasture not being suitable for them, as has already been explained. Australia possesses runs on which the number of cattle reaches from 50,000 to 60,000, and more. The squatters devote themselves almost exclusively to the breeding of cattle, horses, or sheep; agriculture is only practised in the neighbourhood of the coast and on the Darling Downs, the carriage of wheat from the interior being much too difficult and costly a matter considering the wretchedness of the roads. The export of so precious an article as wool is far more remunerative, and so is that of cattle and horses, as these living "goods" are able to accomplish the journey from the farthest interior to the coast towns on their own feet. The squatters do not even cultivate wheat for their own wants, but prefer buying their flour of farmers in the adjacent parts. At Coonambula they only grow just enough oats for the stallions, and some forage for the station horses, to keep them in good condition during the dry season. The half-wild cattle are left at liberty to graze in the wide grassy bush, and are bred principally for the butcher. From time to time herds of several hundred or thousand head ready for sale are mustered and taken to the coast by some experienced stockmen. The principal market for the whole of Queensland is Sydney. The "overland trip" from the Burnett to that town occupies two or three months. Recently, however, "freezing works" have been erected in Brisbane, and also north of the Burnett in Rockhampton on the Fitzroy river, and here the meat is prepared and made ready for shipment to Europe. It is hoped by this method to raise the fallen price of the cattle. Dairy establishments have no value, save in the neighbourhood of the big towns. In the bush they are only kept up so far as to satisfy the squatters' private demands. Mr. M'Cord, however, has established a dairy farm on the north-eastern boundary of his district, which furnishes milk and butter to the little mining town of Eidsvold. This settlement is just beginning to flourish in the place of a former station of the same name, on which gold had been discovered some years ago.

The breeding of horses is quite a passion of the Australian squatter, and his principal mode of conveyance not being his own but his animal's legs, the sale of horses within the country itself is very considerable.

For some years past great numbers of the strong and vigorous Australian horses have been exported to Java and particularly to India, for military purposes. The breeding and production of horses in Australia has, however, increased to such an extent during the last few decades that their value is perpetually decreasing in spite of the widening of the market. You can get a tolerably good horse for £2 to £3 in the bush, and on many stations an excellent half-bred can be bought for £8 or £10, worth ten times as much in Europe. These are the descendants of horses imported from England fifty years ago, and crossed with Arabian thorough-breds, so as to endow them with greater durability. Recently English thorough-breds are almost exclusively used as stud-horses, and already a special Australian breed may be said to exist, adapted to the conditions of Australian life to an eminent degree. For riding purposes they rear a middle-sized horse, which for hardiness and endurance beats almost any other breed in the world. You can ride a real good Australian horse for weeks, making it do forty or even fifty miles a day, without giving it other food than the grass it finds at night on the pasture. It is true that a corn-fed European horse can clear greater distances for a few days running, as the "distance-riding" experiments made by German and Austrian officers during recent years have proved; but while European horses can stand such exertion but for a short time, they would be sure to break down if fed only upon grass before and during such feats. Besides these breeds, several kinds of ponies are reared for carriage service, and, finally, some stations make a specialty of breeding heavy draught horses.

Mr. M'Cord invited me to stay at Coonambula till the following day, and introduced me to his wife and her mother, Mrs. Wall, the widow of an English clergyman at Barbadoes. Very soon I also made friends with the children, two boys called Ned and Percy, and two girls, Tephi and Winnie. The children received their instruction from their grandmother, not only in the elementary subjects, but also in French, Latin, and German. Mrs. Wall was a wonderful old lady indeed, and it would be difficult to find a woman of such extensive and sound knowledge and accomplishments in any European metropolis as I had the good fortune of meeting out there in the heart of the lonely Australian bush. She had travelled in America, Europe, and Australia, had resided for a long time in Oxford, and enjoyed the intercourse of many learned men of that city. She had an independent and unprejudiced opinion about most things, and as that did not always coincide with my own we occasionally had a very lively time of it, and enjoyed friendly little battles con-

cerning religion, politics, natural science, and particularly spiritualism. Besides the above-named persons, a young gentleman, Mr. Peile, at that time working on the station, formed a member of the family circle. It being a Sunday, there was no work going on, but everybody was indulging in his private hobbies and occupations. Within the Australian towns the Sunday is kept almost as strictly as in the mother country, and a traveller like myself, used to continental European customs, has to get reconciled to these habits, which are not at first very much to his taste. In the bush, however, one is not so particular, and when, for instance, the cattle are waiting to be mustered within the yards, and suffering from hunger, thirst, and from the closeness of their temporary abode, it is thought no sin to work through the Sunday in order to relieve the poor beasts the sooner. No good squatter, however, will grudge his men their well-deserved rest and their quiet Sunday. Then it is that the stockman mends his clothes and washes his moleskin trousers and shirts; and whoever has a hobby, or possesses some special skill, will practise it on that day. One goes to fish in the creek, another is seen deep in a book, and the cook and housemaid of Coonambula love to enjoy an afternoon ride, accompanied by the gallant groom. When I camped nearer to the station later on, "Professor's Camp" grew to be a favoured resort on these occasions, and Dahlke used to do the honours of the place to the young ladies in my absence.

I had just arrived in time for lunch, and having partaken of it, my host showed me the out-houses and his two splendid stallions, whilst the children made me acquainted with the poultry-yard, the schoolroom, and with their different pets. Of course the station had its own tennis-court, the use of which on Sundays, if not encouraged, was at least tolerated by the stricter members of the family. Dinner was taken at half-past seven, and you were supposed to dress for it on Sundays and week days. A dress-coat, indeed, was not *de rigueur*, still, a guest was expected to exchange his working suit for another garment. The children did not take part in this late dinner, which was followed by some music and by a game of whist. On Sundays the latter amusement was quite out of question, and Mrs. Wall was very careful lest any profane sounds should intermingle with the Sunday music—a great temptation for the younger ones to introduce worldly melodies by stealth, and to exult when this innocent little fraud was crowned by success. In whatever way they were spent, these Sunday and week-day evenings at Coonambula will ever remain among my most pleasant recollections, and I used to look forward to them with real

longing whenever I felt somewhat lonely in my camp, when the scientific results were scarce, the disappointments numerous, or when my blacks were up to mischief.

When I told Mr. M'Cord that I had begun to give the blacks their wages in cash at the end of each week, he shook his head, assuring me that they would certainly manage to do some foolish thing with their money. He told me that whenever he employed any blacks he never paid them before dismissing them, and considered this the only practicable and possible way of dealing with these grown-up children.

On my starting for my camp the next morning, Mr. M'Cord proposed to accompany me part of the way, to show me a spot he thought particularly adapted for a camp. This place was situated no farther than six or seven miles from Coonambula, near the junction of the Burnett and its right-hand tributary, the Auburn. The bed of the Auburn is very deep from this spot till about one mile and a half farther up, and has hardly any fall in this part of its course. Such places, called "waterholes," form a favourite haunt of the Platypus as well as of *Ceratodus*, and therefore this seemed a most auspicious spot for my researches. Two miles lower down the Boyne joins the Burnett. Seen from the left bank of the Burnett, the Auburn junction, densely fringed with tea-trees, offers quite a charming picture, a river landscape of such beauty as one rarely sees except in the tropical parts of Queensland.

Before we visited this spot, my host took me to a small swamp, where he used to shoot wild ducks and geese, of which there is a great variety in the Burnett district. One of them is a genuine wild duck, very much resembling our common wild duck (*Anas boschas*) in appearance, habits, and taste, save that its feathers are of a less handsome colour, and the males hardly more brilliant of hue than the females. The colonists call this the "black duck" and its Latin name is *Anas superciliosa*. Another kind, called "wood duck" on the Burnett, is no genuine duck, but is akin to the "Barnacle Goose," and is scientifically called *Clamyocheen jubata*. Both kinds are easy to shoot, if pursued in regions where they have not been chased before, and where they do not yet know the danger threatening them from that cruel creature—man.

On removing my camp to new hunting grounds, I used to have no difficulty during the first days in stealing up to the water-birds so as to get within shooting range. In an incredibly short time, however, they became shy, and then they were by no means inferior to their European relations in prudence and caution. Wild ducks and

wild geese are among the acutest creatures existing, and those who only know them as domesticated animals, unable to exercise their natural instincts and faculties, can have no idea of their keen powers of observation and discernment. There is more in the head of such a goose than is dreamed of in our philosophy. The nickname of "silly goose," used to designate the intellectually inferior members of fair womankind, seems just as inadequate to the huntsman as is the epithet "stupid ass," which we generally reserve for members of the male sex, and it throws unmerited blame on that good and useful animal.

Being mostly alone during my rides and excursions, I had no other means of shooting the ducks than by stealing upon them, when they were resting on the waters of the rivers or swamps. This is only possible where one can approach under cover of thick tea-trees and river-oaks. To approach the game on an open or thinly-wooded ground is quite hopeless, and I soon gave up every attempt in that direction. But even when thickets of tea-trees allowed my coming within range, I had to use the utmost precaution, had to crawl forwards on hands and feet, to avoid every sort of noise, and even every movement from the moment I saw the birds, or they consequently might notice me. In spite of all these precautions, I was often done out of my game. Mr. M'Cord had initiated me into another method. He knew the direction the ducks were wont to take in leaving this swamp for the river, and putting me in a place they would be likely to pass, he galloped to the other side of the water and scared them. Our birds were, however, sly enough to choose another way and avoid the neighbourhood of my gun, thus obliging us to leave the field empty-handed.

Some squatter-pigeons (*Geophaps scripta*), which flew up before us and could be shot easily enough, were but a small compensation, for, good as is their flesh, they form too tiny a morsel for appetites sharpened by bush life. These pretty little brown pigeons are often seen in this part of the bush, and may be called tame, since they let you approach quite near, and, when scared, only fly up to the first branch that presents itself, where they settle down in a stupid and indifferent way. Contrary to the ducks and geese, they do not gain wit by experience, and would very soon be entirely destroyed in a more populous country.

An hour before noon I separated from my companion, and had to ride another two hours till I reached my camp. On arriving there, I saw Dahlke coming to meet me with a very long face. "Everything going on well?" I asked him. "Have the blacks brought in anything since the morning?"—"The blacks have not been out

to-day," was his answer. "Whatever is the matter," asked I; "they were to search for Echidna from early morning."—"All the camp is drunk since yesterday," was his answer; "most of them are so stiff that they can't move, and Johnny has nearly beaten his wife to death." Next he began a long sorrowful tale, which ran to this effect. On Sunday morning two of the blacks, happy possessors of horses, had set out for Mundubbera with the greatest part of the wages paid by me on Saturday. There dwelt worthy Mrs. Corry, like the bad witch in the fairy tale, and from her they had purchased four bottles of abominable rum for heavy money. As was to be expected, the old lady had not been able to resist the sight of coin, in spite of all my previous entreaties and warnings. The best of the thing was that the two ambassadors had already got totally drunk in the course of their ride, and had arrived in the camp in a perfectly senseless condition, having lost one of the precious bottles by the way. This, however, was found by some children sent out to look for it. And now all the camp, men, women, and children, had set themselves about the speedy consumption of the sweet poison, which has not its equal in taste or effect.

This was the burden of Dahlke's woeful tale, and it seemed as if he felt personally insulted by the abominable behaviour of the blacks. He had even tried to interpose, of course with no success whatever, and expected me to take determined measures on the instant. I, however, did not see the use of this, after having heard that the rum had been swallowed to the last drop, but I resolved to have a word with them on the morrow, when their buoyant spirits of to-day should have given place to the state of wretchedness, usually in the wake of such orgies. I was right in my expectations. On the next morning they came sneaking up to my tent, listless, crestfallen, and low-spirited, and even their sable complexions seemed to me a shade more faded than usual, not to say "sallow." Having never harboured any high opinion as to the success of lecturing, I thought a sermon particularly out of place in this instance. Was not my own inexperience at the bottom of the whole affair? Had I not given them cash this mischief would have been avoided. I expressed my resentment of their behaviour to them in a few concise words, and told them that from that day they would have no more money paid down to them. Everything should be noted and paid at the end. Thereupon long faces, but no serious contradiction. Mrs. Corry, to whom I paid a visit the next day, put on a mien of injured innocence, but her denial was of no use, and at last she begged me quite contritely not to ruin a poor old widow, and promised "never to do it again"!

During the following days everything went on in the usual way. I shot *Platypus* and searched for *Ceratodus* spawn, whilst the blacks hunted *Echidna* in the scrubs; but their zeal had visibly cooled down, since there was no hope of cash and of a subsequent debauch at the end of the week. Never again, during the whole of my campaign, did I attain the good results of the first week.

My readers will perhaps be surprised that I so strictly prohibited any intemperance on the part of my blacks at the cost of my own success, for I should certainly have been more prosperous had I kept to my first system of payment. I will not deny that it was not so much my aversion to their drunkenness that determined my actions, as the fear of getting involved in serious difficulties. The blacks on the Burnett are at present peaceable, and would not be likely to attack a white man. Even had their blood been heated by liquor, I could have easily defended myself against them. The Australian black will only become dangerous when he can spear a white man from an ambush, but not in attack, the only form open to men excited by drink. What I was more afraid of was that such a debauch might bring on quarrels among the blacks, and terminate in their killing each other, no rare occurrence among these tribes. Generally they fight out their quarrels at fixed times and places, more often on the occasion of their so-called Corroboree, an old and sacred custom of theirs. The devil's drink of the white man is, however, powerful enough to destroy old customs and hallowed traditions, and it was to my own interest to prevent any complications that might have paralysed my activity for a considerable time.

Before the next week had elapsed, the blacks declared that they had now exhausted the neighbouring scrubs and thought it best to move to other quarters. They proposed a dense scrub near a tributary of the Boyne, Jimmy's Creek, on which they founded great hopes. This place being hard to reach with the heavy dray, but not too far from our present camp, I preferred to remain at the latter for the time, and to make one of the blacks bring me the day's bag every evening. Frank stayed with me, and alone, or in his companionship, I daily took long rides along the banks of the Boyne as far as the Burnett, and even to the Auburn, for fear of missing the spawning-time of *Ceratodus*. Frank, indeed, declared that it was still too early for these researches, and that the rivers ought to be low and full of weeds. Then, he was sure, the spawn would be found by us in abundance. I had not much confidence, however, in the good-for-nothing fellow, and thought it best to keep my own eyes wide open. I knew that Mr. Caldwell had found the spawn

among the water-weeds, and was rather disappointed that these rivers, the course of which I could follow for miles, were utterly devoid of plants.

During the past months violent rains had set in on the Burnett, and the rivers, but now low and sluggish of movement, had been turned into rapid and mighty streams. These heavy floods utterly raze the river-bed at such times, tearing out and demolishing all the tender water-weeds. Now, after the floods had dispersed and the rivers had sunk to their usual level, the weeds had not yet found time to settle again and to spread, where remnants of the old plants still clung to the ground. This made the search a hard and nasty job for both of us. When, after hours of riding, we found a spot, where the still muddy water seemed to indicate signs of vegetation, we jumped from our horses, and, great as was Frank's disgust, plunged right into the river. It was Frank's habit to deny the existence of any vegetation whatever on principle, but I soon found out that it was the fear of the cold water which blinded his generally so infallible eyes. So I remained deaf to his remonstrances, and wherever the river-bed seemed to offer any chance of our finding plants, we dismounted and searched that spot. This was generally to no purpose, but here and there in sheltered places we found certain algae and the well-known *Vallisneria spiralis*, a plant which thrives also in European waters. Further, a kind of Lepilaenid, much resembling our *Zannichellia*, and *Hydrilla verticillata*, which is excessively like *Elodea canadensis*. Frank turned my attention especially to the Hydrilla, declaring the network of its leaves to be a favourite depository for the eggs of *Ceratodus*. It was impossible, however, to detect any traces of the eggs, and I began to believe in Frank's assertion that the time had not yet come. Meanwhile the efforts of my blacks on Jimmy's Creek were likewise very unproductive, and I thought it better to keep them under my eyes. So I made up my mind to move my camp to the place recommended by Mr. M'Cord—the Auburn junction.

On the 18th of September we broke up our camp, and early that day Dahlke started for the chosen place, accompanied by Frank. He hoped to reach it in about twelve hours with his heavily-loaded dray. I myself set out for Cooranga to say good-bye to Mr. Turner and his family. At twelve o'clock I started thence to reach my new camp before darkness should set in.

I will enter somewhat into a description of this ride, since it is illustrative of the difficulties besetting a novice on his lonely wanderings through the bush.

To reach my new camp, which was about twenty miles distant from Cooranga, as the bird flies, I had either to follow the main track leading from Cooranga to Coonambula, leaving it where it crosses the Auburn, and to follow the Auburn to its junction with the Burnett; or I might follow the Boyne to where it joins the Burnett, and then ride up the Burnett to Auburn junction. My inexperience, however, tempted me to choose a third route, which seemed to me shorter, namely, to ride in a straight line from Cooranga to the Auburn junction. At Brisbane I had provided myself with some rather rough charts of the Burnett district at the Ministry for Land, and thus, having traced my course and determined the point of the compass, I tried to push forward in a straight line from east-north-east to west-south-west.

As I found at that time, and have since had occasion to note, it is not easy to walk, and still less to ride in a straight line for a long distance without a road or a visible point of destination. Nearly every one will turn off quite imperceptibly and gradually from the straight direction, one man to the right, another to the left. Therefore it is no rare occurrence in Australia for a traveller to leave one place in the morning, intending to make straight for another, the situation of which has been signified to him; but to find towards the end of the day a settlement appear before him, which he hopes to be his destination, but which, however, proves to be the very same point he left in the morning, reached once more after describing a wide circle, and by loss of a day of his precious time. More than the men themselves, the horses tend to deviate from their direction, when supposed to walk straight on in the pathless bush, but only if they have not previously visited the place the rider seeks. Whenever I wished to return to my camp, which was well known to my horse Schamyl, he always made straight for it, apparently quite sure of the direction he had to take, a most wonderful and hardly explicable instinct. If, however, I tried to ride straight on without any special destination, all the horses I ever rode used to deviate to one side or another, and some of them changed an eastward course into a north-eastward during the first half hour, if not prevented from doing so by vigilant attention.

On the day in question, I relied upon a little pocket-compass which I had brought with me from Europe, but I never used it later when once accustomed to consult that unerring compass, the sun. It was twelve o'clock when I started from Cooranga, and, as the sun set at six, I had full six hours in which to cover the space of twenty miles at leisure. So I did not hurry, but began by

loitering for half an hour, and trying to steal up to some ducks, which I saw swimming at a distance on crossing the Boyne. It was nearly one when I left the Boyne to make for the Auburn junction in a straight direction. All went smoothly at first, the day was fine and warm, without being oppressive, and the sky clear and cloudless. The grass which covered the ground below the high eucalyptus-trees, as far as eye could reach, was just beginning to grow anew, and to adorn the landscape with its vivid green. After having ridden for an hour, I, however, came upon an obstacle for which I was quite unprepared. This was a scrub, which rose in front of me and seemed to stretch endlessly to the right and to the left of my path. Was I to avoid this impediment by skirting it, or was I to try to cross the thicket on horseback? As the former attempt would have perhaps brought me out of my way for many miles, I speedily resolved to take the latter course. Although this scrub was none of the densest, my advance was very troublesome and slow, the trees standing so close in some places that it was impossible to find a way through them. Their branches kept striking my face and molesting my horse to the utmost. Besides, I had to attend to the ground, which, covered with dead trunks, formed so many traps for the legs of my beast. There are horses which behave most courageously and smartly on such an occasion, and are a real help to their rider, and it is best in such cases to let them choose their own way. Poor old Schamyl was not such; he was anxious, easily confused, and apt to turn back at every obstacle. He even had the amiable habit of turning his head and trying to bite my leg whenever I wanted to spur him on to some little enterprise, a trick of which I gradually cured him by severe punishment.

My joy may be imagined when, after three-quarters of an hour, the scrub thinned, grew lighter, and gradually changed again into the open bush. I pushed on briskly, thinking all the while, "Now beware of a second scrub." At 4 P.M. this fear was realised, and I was in the same predicament as before. This time, however, I did not waver, but, encouraged by my first success, began to traverse the thicket. My progress was slower than the first time, the vegetation of this scrub being much denser, so that in several places I had to dismount and lead my refractory horse by its bridle through the brigalow bushes.

On one spot I saw a pair of big black birds, reminding me of turkeys in size and appearance. Hardly had they perceived me, when they ran away and disappeared in the green bushes. I instantly knew them to be a pair of the mound-building *Tallegalla*

fowl, which have the peculiar habit of laying their eggs in big self-constructed mounds, and of leaving them to be incubated by the warmth of the rotting vegetable substance. The settlers on the Burnett call this bird "scrub-turkey," whilst in some parts it is called "brush-turkey." Its scientific name is *Tallegalla Lathamii*, Gould. It is not easy to shoot unless you have a dog with you, for it will run away and hide in the thicket before the huntsman can approach it. Dogs, however, easily make it fly up. They then call you to the spot by their barking, whereupon you have easy work, the bird being a bad flyer and slow of movement when once driven up from the ground.

I lost an amount of time in trying to shoot a *Tallegalla*, and it was past five when I left this second scrub. At six the sun would set, and pathless riding in the dark in a perfectly unknown country is not very alluring. After all these little obstacles and delays I had no clear idea left as to the number of miles I had covered, and my distance from Auburn junction. At six o'clock it grew rapidly dark, and before me now lay the endless unbounded bush. No vestige of a valley, neither of the Auburn nor the Burnett, which I was so ardently seeking. I knew that the moon would be rising towards ten, and that the hours between sunset and moonrise would be the most troublesome for riding. Notwithstanding this, I tended onwards on my tired horse, always in hope of seeing the goal I had in view suddenly rise before me.

After the sun had set I chose one of the stars for my guide and rode steadily on, fixing my eyes upon this friendly object. The night was cool and cloudless, the darkness intense, though not absolute, owing to the glittering of the stars. All at once I found myself on the margin of an apparently impenetrable scrub, and knew directly that for this day all was at an end. First, I tried to ride along its border, now to the right, now to the left; but soon I desisted, not being able to observe any thinning of the wood, and fearing to lose my direction entirely. I even made one desperate effort to penetrate the scrub in spite of the darkness. After a hundred steps, however, I gave it up, and that was lucky, for the obscurity of the wood, the heaps of dead trunks on the ground, the swampy condition of the soil, might have ended in breaking poor Schamyl's legs, and I should have been sorry indeed to see the innocent beast suffer by his master's fault. So I had nothing left but, instead of pulling a long face at ill-luck, to dismount and to settle for the night. In itself this was nothing extraordinary, for no one in Australia makes any fuss about having to spend a night

under the open sky without tent or covering. On this occasion, however, my defencelessness against the chilly night air, and the complete lack of water and pasture for my exhausted beast, were rather unpleasant.

All this, however, as it could not be cured, had to be endured, and so I took off the saddle of my poor horse, and hobbled it with a leather strap. Horses hobbled in this way are still able slowly to move about and to graze comfortably, but they cannot get far away from the camp, not being able to trot, but only to jump in a rather clumsy manner, so that there is no trouble in catching them. My next care was to light a good fire. Unfortunately, I had no eatables whatever with me ; and after this I never set out without some light provisions and tea ; also a little tin pannikin and a billy were henceforth inseparable from me ; likewise a warm blanket for longer rides, so that I never again minded camping for the night wherever chance would have it. After having lit my fire, and collected a store of wood in reserve, I prepared my couch, with my saddle as pillow and the horse-cloth as covering. My gun, my hat, and my spurs I laid in the grass beside me, whilst my horse stood stock-still some steps from the fire, resting from the fatigues of the day without taking any notice of the dry and scanty grass that grew on the border of the scrub. I lay down with the resolve not to let the fire go out, and to watch my horse. Soon my ideas got more and more vague, and, thoroughly exhausted as I was, I fell asleep. On awaking after an hour's repose, the situation was unchanged, my horse in the same place, the fire cheerfully burning, deep silence all around us. Suddenly I seemed to hear in the distance, from the direction towards which I had tended all day long, a faint sound of bells. We used to attach bells to our horses' necks when they grazed outside the camp, so that we might have a clue to their whereabouts. Could these tinkling sounds proceed from my own horses, and my new Auburn camp be but a few miles distant ? I listened and listened, and for some time all was silent ; then again I heard some faint tinkling, which is so characteristic that it cannot be mistaken for any other sound in the bush. On foot I tried another advance in that direction, and thought of turning back and repeating it on horseback if I found the way practicable. After a few steps, however, I was convinced of the impossibility of crossing the scrub in the darkness, were it to be but for the space of a few hundred feet. Once more I sought my couch, and once more I fell asleep. On waking again I discovered that my horse had shaken off his lethargy, and, discontented with the scanty pasture, had begun

to move away. This was not to be permitted. Schâmyl seeing me approach, bridle in hand, grew refractory, and began to jump away by lifting his fettered forefeet simultaneously, and jerking himself on with his hind-legs. As he had the start of me, it took me nearly half an hour to catch him. During this mad nocturnal pursuit I had looked back for my fire several times, fearing to let my beacon out of sight. Though in the supreme excitement of the last moments before capturing my horse this precaution had been forgotten, it was my first care as soon as I had caught the fugitive. Vainly, however, did I now seek. Believing myself certain of the direction in which my fire lay, I advanced with determined steps, leading my horse by the bridle. I strode and strode onwards, no fire to be seen. The scrub grew denser, and I more and more convinced that I had lost my way. I turned back, sought for the gleam to the right and to the left, before me and behind me—all in vain. The moon had now risen and shed her magic light over this bewitched forest, which not only proved impenetrable to the wanderer, but robbed him of the few goods he possessed.

Once, on halting to take some moments' rest, I saw a little beast, about the size of a rabbit, hopping about before me, uttering a grunting noise. This was a male of the so-called Bandicoot, *Perameles obesula*, an insectivorous marsupial, which was abroad on its nightly love-making. My gun having remained near the fireplace with my saddle, spurs, hat, and cartridge-belt I was not able to shoot the game, which so conveniently offered itself to me by the light of the moon. Discontentedly I wandered on, leading my horse, ever hoping anew, ever disappointed. Once I came to a spot covered with a mighty fallen tree, which seemed to be hollow, since its inside resounded with yells and howls as if from a litter of young dogs. No doubt this was the nest of a dingo. Some days later I returned to the spot to secure some of the puppies, but did not find the tree.

For hours I kept wandering about in this way, and felt at last that my feet would carry me no longer; while my horse let himself be dragged on despondingly without any will of his own. Luckily, it was a glorious moonlight night, and not so cold as its predecessors. Towards one o'clock I began to perceive that it would be foolish to persevere in my search. The fire, not having been looked to, would have long since gone out. The best plan was now to lie down till dawn and to continue my search by daylight. So I chose a place near the border of the scrub, tied my horse to a tree, lit a

second fire (having fortunately kept my matches in my pocket), and slept like a dead man on the bare ground beside it. From time to time I awoke and laid on some wood. Schamyl the while stood meekly near his tree with bowed head. "Serves you right, you wretch," thought I, and slept on.

At last this night came to an end. It seemed to me the longest I had ever spent, although it had lasted only twelve hours, and with the utmost interest I scanned the scene of my nightly experiences. I found myself on the border of a very dense scrub, which was particularly impracticable, by being in many places interspersed with bogs and swampy little ponds. To seek for my first resting-place and for my goods was just as hopeless now as during the night. I found my own traces, made in searching for the lost articles, but no vestige of the latter.

After having spent two hours in this manner, I resolved upon resignation. The thought of returning to my camp saddleless, hatless, without gun or cartridges—a beaten general—was not enticing. But being convinced that my chances grew worse instead of better by waiting, I and my gallant steed becoming worn out with hunger and thirst, I swung myself on the back of my animal and began to traverse the scrub in a north-westerly direction. I have no wish to tire my reader with a description of this wretched morning ride on the hungry, unsaddled horse, myself famished and parched with thirst. After an hour's ride I had mastered the scrub, and soon arrived at a river, the direction of which, south-south-west to north-north-east, told me that this was the Auburn. I rode down its course, scorched by the rays of the sun which shone relentlessly upon my bare head. After the lapse of another three-quarters of an hour I saw something white glimmering through the trees. Quickly galloping towards it, I recognised a tent of my new camp, which Dahlke was in the act of raising with Frank and another black. Dahlke was quite concerned to see me in so lamentable a condition, and asked me anxiously what had happened.

As may be imagined, I was not exactly in a talkative mood, but made him get me some tea, meat, and bread, for I had been nearly twenty-four hours without tasting a morsel, mind and body kept in considerable tension almost all the time. After having partaken of refreshment and rested awhile, I told Dahlke my whole adventure, and was agreeably surprised by his telling me that my case was by no means a rare one. According to his statement, it happened frequently that the solitary bush-traveller was brought into worse dilemmas than I had undergone, by his horse's abscond-

ing from him ; and some time after, I read in a Brisbane paper about an event which had taken place in the north-west of Queensland, which greatly reminded me of my own adventure. The article was entitled "Lost in the Bush." A surveyor had been riding over an unknown country, and had not returned for several weeks. Black trackers were thereupon sent out, who found the following state of things. The surveyor had been camping for the night in a scrub, four days' journey from his starting-point. During the night his horse had walked away from him, and according to the traces the blacks found, the horse had broken its hobbles, whereupon he had followed it all day without being able to catch it. On the second day he seemed to have given up all hope of finding the horse, for his track did not follow the animal's any more. He seems at that point to have become quite at a loss what direction to take. First he tried to find his old camping-place, and, on failing in this, he seems to have wandered about in a desultory way, instead of marching pursuantly in one direction. Every day the space he had cleared got shorter, as appeared by the resting-places he had prepared for himself every evening. At last his body was found, and it was evident that death had overtaken him, brought on by exhaustion and hunger. This case is quite typical of the one species of danger which the traveller incurs in the otherwise tolerably harmless Australian bush. The Australian is well aware of this, and likes to take a "mate" with him on his expeditions into newly-opened uninhabited districts. If he has several horses, there is hardly any danger, he can tie one of them to a tree or enclose it in an extemporised paddock and turn the others loose upon the pasture. Having *one* horse at hand, there will be no difficulty in catching the others, even should they have got farther away from the camp, or should one of them have broken its hobbles. The fetching in of the grazing horses is, however, always a time-robbing and tedious business, particularly as it often spoils the early morning hours so agreeable for travelling.

Of course I myself had been in no imminent danger that day. Even had I lost my horse, my knowledge of the country and the different watercourses traversing it would have enabled me to find my camp, or else to reach Cooranga or Coonambula. Far greater is the difficulty in a district of a desert character, lacking rivers. When quite at a loss about his way, the traveller will always do best to follow the very first river or rivulet he finds in its downward course. This will give him the best chance of hitting upon human habitations.

In the afternoon I set out with Frank to seek my lost things.

Frank solemnly asserted that he would easily find the place, having only to follow my traces, which he read from the grassy soil, as we read a hare's or a deer's track on freshly fallen snow. So we crossed the scrub, keeping to the trace I had left, and soon found ourselves at the spot of my second night-quarters. Here Frank went seriously to work, whilst I dismounted, patiently awaiting the result. After more than an hour, he returned rather downcast. His beautifully devised plan of finding the spot by pursuing my track had failed, since my wanderings during the night and morning had produced a labyrinth of tracks crossing one another, whereby it seemed quite impossible to gain our point by following them. Frank said he would make one more effort and try to detect the place without further consulting my tracks. In this latter plan I had no confidence whatever, and was just reflecting whether I had not better summon all my blacks to search for my irreparable losses, my saddle and gun, when I heard Frank's triumphant call "coo-ee," not far from me. Up I jumped, following the direction of his voice, and, on turning aside some brigalow shrubs, the much sought-for spot lay before me. My glaring white helmet, which I at a later period changed for a broad-brimmed felt, had attracted Frank's falcon eye by shimmering through the bushes. All the other objects lay about just as I had left them; the fire must have gone out soon after I began my chase of Schamyl, and failed to serve me as beacon when I was so much in need of one.

CHAPTER IV

THE AUBURN CAMP

THE spot near the Auburn junction appearing very favourable for our purposes, we settled for a longer stay. I had brought two tents with me from Gayndah, one of which I made my bedroom, the other my laboratory. We took our meals in a little "hall" we had built, which was open at the sides. First we covered it with bushes, later on with bark; so that it furnished us a nicer and airier place to sit in than the tents. Our fireplace was likewise sheltered by a roof of bark, which prevented the rain from putting out our fire. Some pieces of wire which I had brought with me from Coonambula were drawn at a suitable height above the fireplace, and on them we hung our cooking pots by the help of some hooks—a great convenience. Besides, we had a big iron camp oven, which served all our frying and baking purposes. We used to surround and cover it up with red-hot ashes, and were very pleased with the results.

Every other day bread was baked, the so-called "damper" of the Australian, that is to say, bread without yeast. "Knead a dough of flour and water, adding some soda powder to make it rise, then put the dough as it is in the hot ashes, or bake it in the camp oven." This simple receipt will furnish quite a savoury meal when newly baked, whereas after a course of some days it is hardly to be eaten. We even baked a sort of cake on particularly festive occasions, the "Brownny" or "Johnny cake" of the Australians. Its production is based on the same principle as that of the damper, but the dough is made rich by adding some sugar, suet, and, if possible, some currants and raisins. Dahlke had been so wise as to supply us with several pounds of these. The animal part of our diet consisted of salt meat, which we first got from Cooranga, afterwards from Coonambula, and for which we generally paid 3d. a pound. It was soaked during one night to dissolve out the salt, and thus prepared and well boiled, it furnished us a nicer meal than

any tinned or preserved meat. Once a week we had fresh beef, and this was regarded as a great treat by all of us. The game we killed—wild ducks, wild geese, scrub turkeys, squatter and wonga pigeons—were roasted in our camp oven, and formed an agreeable variation in our somewhat uniform bill of fare.

Our regular drink was tea. We made it our friend in the morning, at noon, and at night, and, together with its companion the "damper," it deserves to figure as an emblem of bush-life. Nobody thinks of drinking coffee when camping out, spirits will soon run short, and tea remains master of the field. When it happens, however, that the friend of liquor, tired of tea and abstinence, comes within reach of an inn, he is apt to make up for past sufferings by copiously partaking of the host's whiskies and brandies. In German academical circles this method of hard drinking at intervals is termed "Quartal-Trinken," and never, in my life, have I observed this practice carried to such perfection as during the two years of my stay in Australia and its neighbouring countries.

Dahlke proposed to erect a 'humpy,' in which we might keep our provisions, and where he himself might sleep. While he built up the framework, the cutting of the bark was entrusted to the blacks, Jimmy and Ada. For this purpose they turned to the "iron-bark tree," *Eucalyptus crebra*, and to the blue gum; and their mode of procedure is as follows:—They cut a ring close to the ground all around the bark of a stately tree of at least 4 feet across by means of a tomahawk, and another ring at about 8 feet above the former, as high as they can possibly reach with the axe. These two rings are now connected by a vertical slit, reaching from the one to the other, whereupon the bark is stripped from the trunk in one cylindrical piece. This they lay flat on the ground, pressing it down with heavy stones or logs to prevent its rolling itself up. In this way they obtain huge sheets of bark, perfectly suited for covering the wooden framework above mentioned. These humpies furnish a much cooler retreat than the tents during the hot season. It is a pity that their splendour is of short duration. Soon the bark begins to bulge and to shrink, the little edifice, at first smooth and tidy, shows bulks and bumps innocent of architectural style, splits and hollows ensue, and he who intends to dwell in one place for several years will do better to choose another material for his house than the "iron bark" of the eucalyptus, the only timber the blacks of these regions are wont to employ for their dwellings.

During all this time the blacks used to bring me plenty of female Echidnas and numerous marsupials. Most of the Echnidas

already carried young ones of considerable size in their pouches. My results, however, were not so good as at the outset, for the zeal of the blacks had considerably cooled down since they were no more paid in cash, and a certain discontent fermented among their ranks. For *Platypus* the Auburn camp was not so favourable as I had hoped. To all appearance, many conditions united to make the place suitable as a dwelling for the animal. A deep and extensive water-hole, in which the water was hardly observed to flow, was surrounded by sloping banks densely fringed with tea-trees. Something we were not able to detect with our human senses must have either been wanting or been in the way to prevent the water-moles from frequenting the Auburn junction. The rivers were yet high, rapid, and muddy, and all our efforts to find places with a rich vegetation of water-weeds had hitherto been in vain.

The 20th of September being a Sunday, I set out early to pay a visit to Coonambula. On returning from there the next morning, and following the carriage-track leading from Coonambula to Gayndah, I encountered the coach which runs twice a week between Eidsvold and Gayndah. The coachman, Bates, called out to me in passing, "There is another professor now at Gayndah!" "What sort of a professor?" "One who is also looking for Burnett salmon." More was not to be got out of him. Of course this news interested me extremely. What a wonderful coincidence, if at the same time I had sought this far-off region, another naturalist should have come here with the same intentions. This seemed so improbable a thing that I thought it best not to trouble my mind about it. Perhaps it was some one collecting for the museums of Sydney or Brisbane, or some amateur naturalist, to whom these good people had attached the title of "professor," with which the Australians are very liberal. Sellers of patent medicine and ambulant dentists will call themselves "professor"; I once even found that a man travelling with a magic lantern about the stations had assumed this name, and was universally called by it.

Hardly had I reached my camp, when Frank came running up breathless and beaming with joy. He brought in a glass some gelatinous masses, similar to those covering the eggs in frog spawn, and declared them to be the investments of *Ceratodus* eggs, the little fish having already escaped. He had found them in the water, not amongst the water-weeds, but imbedded in a little hollow of the river bottom. As I had promised £1 as reward to him who should first bring me some spawn of *Ceratodus*, he was overjoyed at having won this prize. Great was his disappointment on my telling

him that I did not want the empty teguments, but the eggs themselves. Besides, I had to make sure of this being the genuine spawn of *Ceratodus*, no common frog spawn. The whole thing was, however, of the greatest importance to me, so that I speedily returned to Coonambula, to show Mr. M'Cord the object in question. He knew the *Ceratodus* eggs through Mr. Caldwell, who had been staying with him ten years ago, pursuing the same studies which had brought me here. There existed still another link between Mr. M'Cord and this most wonderful fish. Science owes the discovery of *Ceratodus* to a cousin of Mr. M'Cord's, a Mr. William Forster, from whom it derives its name of *Ceratodus Forsteri*. Mr. Forster had himself been a squatter on the Burnett, and had eagerly cultivated the natural sciences besides his private business. On his moving to Sydney at a later period, he directed the attention of the director of the Sydney museum, Mr. Gerhard Krefft, to the curious Queensland fish, and tried to find out whether it was already known to science. Krefft would not at first believe in the existence of such an animal, and was sure of an error on the part of Forster. To clear up the matter, Mr. Forster begged his cousin in Coonambula to send him some specimens of the animal in a salted state to Sydney, and this was carried out in 1869.

My friends were somewhat doubtful as to the nature of Frank's discovery; but they declared it to closely resemble *Ceratodus* spawn. Old Mrs. Wall was the only one to assert with assurance that this was not the genuine article. The gelatinous egg mass of *Ceratodus* ought to be as clear as water, whilst those found by Frank had a greenish hue. At all events, my efforts to find the real eggs were from this day redoubled.

The river began considerably to fall at this period, and to my greatest joy I discovered a long and extended water-hole of the Boyne (about half a mile from its junction with the Burnett), the bottom of which was densely grown with water-weeds of a promising aspect, though not yet high enough to reach the surface. Eggs, however, were not to be seen among the weeds, nor did Frank, who discovered the same spot on the same afternoon independently of myself, find anything of the sort.

This happened on Thursday the 24th of September. All Friday morning we searched the water for the eggs. At noon I returned to my camp, and was going to set about my work once more at two o'clock, when I saw an unknown man come towards me. A visitor in the thick of the Australian bush is always a rarity, and particularly so if he does not come on horseback but presents

himself on foot. My visitor had nothing of the squatter or of the stockman, still less of the common traveller. His own words soon enough enlightened me as to his person.

It was Professor Baldwin Spencer, a young English naturalist, whose name, well-known in biological science through a number of excellent investigations, was of course familiar to me. He had been made Professor at Melbourne some years ago, and was going to use his present vacation for studying the development of *Ceratodus*. I was very much pleased to make the acquaintance of a fellow-worker, and, moreover, such a distinguished one, out here in the bush; on the other hand, however, I must own that the thought of Spencer's pursuing the same objects as myself, and of our interests rivalling with each other's, was not altogether agreeable to me. Spencer's feelings, on my telling him that my own aim was likewise the development of *Ceratodus*, were very similar to mine. He had been staying for some time at Gayndah, but his researches there had been just as fruitless as mine up here. Hearing from the coachman, Bates, that I had found plenty of spawn, he had come all this way to see me. Baily, an inhabitant of Gayndah, had undertaken to bring him to my camp with his buggy; he was besides accompanied by a boy from Gayndah, who was to help him to fish and collect. The three of them had pitched their tent about half a mile from my camp, and Spencer had come to look me up, while the other two were occupied in arranging their little camp.

I told him about my disappointment as to *Ceratodus* spawn, and that the examination of some full-grown fish, which I had caught during the previous days, seemed to denote that their spawning-time was distant. By chance, a female *Ceratodus* was caught both on this day and on the next. We examined the fish together, but both of them turned out to be unripe. Then I took Spencer to the place on the Boyne, where I had found that rich crop of water-weeds. We examined the plants, but were unable to find any eggs, and all this combined to convince us that the spawning-time of our fish had not yet arrived.

I took long walks with Spencer in the surroundings of my camp, and for the first time since I left Europe I had the pleasure of talking over scientific questions with a fellow naturalist. Spencer was specially interested in Australian earth-worms, upon which he was contemplating an extensive monograph.

After darkness had set in we supped together in my camp, and spent a good part of the warm tropical evening chatting before my tent. The next day was likewise passed most agreeably. Spencer

even thought of sending Baily and the buggy back to Gayndah, and of staying with me as my guest for another week. The situation of my camp being, however, unsuited for *his* collecting purposes, and the prospect of finding *Ceratodus* spawn very uncertain for the present, he resolved to return to Gayndah, there to engage some blacks and to spend the four remaining weeks of his holiday in the tropical scrubs of the coast, between Brisbane and Gympie.

As we were sitting before my tent in the dusk, after our six o'clock dinner, my blacks, returning from their rambles, brought me four female and two male *Echidnas*. This plentiful booty made a great impression on Mr. Spencer, but I had to own that these results were quite exceptionally good ones. On some days I received nothing, on others one or two *Echidnas* as a day's yield. On this evening we finished off some bottles of beer, that I had brought with me for particularly festive occasions. We promised to give news of each other, and to renew our acquaintance as soon as possible, be it at Melbourne or at Jena. Fate decided for Jena; and during the winter of 1893 I had the great pleasure of welcoming my Australian companion to that ancient German town.

Spencer left me the next morning, on September 27th; he remained at Gayndah for about two weeks, without being able to engage any blacks, but was furthered in his aims by the white settlers there. His expectations of the tropical scrubs of Gympie were, however, by no means realised, the fauna of these regions proving very scarce.

My blacks had only kept up their Auburn junction camp, which was some hundred feet from my own, for a short time. Then they had settled further westward, in a place most productive of *Echidna*. One of them used to bring me the entire day's spoils in the evening. No more than three days had passed, when all at once the whole party declared their intention of raising a new camp in quite another direction. I was astonished, but not agreeably so, at this quick desertion of a by no means exhausted hunting-district. The reason of their move, which I extracted from them by and by was this: two of Jimmy's dogs had attacked a so-called "black snake," *Pseud-echis porphyriacus*, one of the most poisonous snakes of Australia, and very frequent in this district, and had killed it after a short fight. One of them had, however, been bitten in the mouth, and had died most miserably. This was a sufficient reason for the blacks to fly not only the spot in which the disaster had taken place but the whole surroundings, since they entertain the superstition that a place where they have met with some disaster, like the loss of

a relative, a friend, or so precious a possession as a dog, will bring them further bad luck. Deeper religious ideas being perfectly wanting, their religious sense has stopped at the point of superstitious fear.

About a dozen black families had gathered in my camp at that period, but only two or three of them performed any work worth mentioning. The control of their day's labour was very difficult, as we were not able to follow them on their rambles, and to make sure of their really pursuing the track of *Echidna* and not giving themselves up to sweet idleness or to the search of nests of the stingless Australian bee, of the honey of which they are excessively fond.

The weeds in the river being so scarce that year, it was natural to suppose that the fish would have deposited their spawn beneath stohes or trunks lying in the water instead of amongst the usual water-weeds. For the purpose of searching the bottom systematically, it was advisable to employ a boat, and I set about making one instantly. The eucalyptus trees and acacias, which principally make up the Australian woods, yield a hard and heavy timber, quite unfit for canoe building, whereas, two other trees of the Bush are splendidly adapted to this purpose, their wood being of a light and soft quality, easy to cut. These are two species of *Sterculia*. The first, *Sterculia rupestris*, a mighty tree reaching a height of 70 to 100 feet, is the "bottle-tree," already mentioned. This is found standing in single specimens on swampy ground. This tree is of a spongy texture, particularly in the axis of the trunk, so that it is very easy to make a dug-out boat of it. In our neighbourhood stood some bottle-trees, but of such immense dimensions that it would have been impossible to use them for a little handy boat. The second *Sterculia* species adapted for boat-building is the Kurrajong, *Sterculia diversifolia*, much smaller than the bottle-tree and without the bottle-like bulging of the trunk. It grows singly on the banks of the rivers, and half a mile up the Auburn we found a well grown, if rather small, specimen, and chose it for our purpose. We felled the tree and began work on a piece of its trunk, measuring 7 feet in length and about 2 feet across. We halved the stem lengthways, removing the spongy wood from the inside of one of the halves till near the outer bark with our axes and tomahawks, only leaving a firm wooden slab at each end. Still there remained more wood than was advisable, and this being considerably heavy, so long as it was fresh, our boat went pretty deep at first and was hard to manage. It soon, however, got dry in the parts not exposed to the water, and thus quite

Seeking for *Ceratodus* Spawn in the home-made Canoe.

light and manageable. The same was the case with the oars, which we likewise cut out of Kurrajong wood. On my return to the Burnett a year later, I chose a bigger Kurrajong, and made a longer and broader boat, carefully cutting away all the superfluous wood, particularly from the sides. The result was a much better one. The photograph of the second boat is annexed. But the first boat was likewise of good service to us, not so much in the search after *Ceratodus*, as during the flood, which soon surprised us.

My provisions of tea, sugar, and flour being at an ebb, and the want of several other articles for our camp becoming felt, I had to send Dahlke to Gayndah to make it good. On Monday, the 5th of October, he set out, returning five days later. During this time I was quite alone and my own servant. I never allowed the blacks to camp any nearer to my tents, and their help in cooking or any other part of domestic service was quite out of the question, as their terrible uncleanness, or rather their want of every instinct of cleanliness, rendered the thought of their living near me impossible. The only work on which I employed them was the carrying of buckets of water up the steep bank of the river. Cooking and baking I did myself, and, after some few failures, I succeeded excellently.

About that time Mr. M'Cord, engaged on a hunting tour, paid me a visit with his three eldest children. They brought me a wild duck, a pigeon, and a bandicoot, and set about fishing in the river, whilst I and Tephie, the eldest daughter, cooked dinner for the whole party. All went off famously, only the pigeon, which we were roasting in a saucepan, suddenly began to burn in its butter. We quickly put out the flames and scraped off the burned crust from our roast. On its being served, however, we made the discovery that it was more than roasted on the outside but perfectly raw within. The bandicoot roasted among the hot ashes was more of a success, but the highest praise was due to the fish, about which the children grew quite enthusiastic. They told their mother that the meat left the bones quite by itself, such an excellent cook was the professor. The brownies also, of which I had a considerable quantity, met with fullest approval, and when my visitors had left me, I was elated with pride at having boldly attacked a new and important sphere of human action and made myself the master of it.

The deep solitude surrounding me during those days, and often enough in after times during Dahlke's absence, or when I made long excursions by myself, was by no means dull or tedious, but most enjoyable. It is very difficult to find solitude to such perfection upon earth nowadays, and I had never known anything like

it before. Even in the desert or on an uninhabited island you are rarely quite by yourself, there always being either the members of the caravan or the crew of the boat about you. In the depths of the primeval forests you generally have companions, and the natives of the country will be in attendance. The immense Australian bush offers *genuine* solitude, by allowing a man to exist in its interior as long as it pleases him, without his undergoing any dangers or difficulties by being alone. Such solitude cannot be compared with the sort which the stranger experiences when staying in a great metropolis, the language of which is unknown to him, still less with the terrible loneliness of a prisoner in his cell. At first the solitude of which I speak was new and interesting to me, and it used to bring me lonely hours and a sense of abandonment, but finally I felt it like a great and mighty revelation, a thing as vivid and intense as the witnessing of the most varied scenes amongst foreign lands and nations. It gives a man time and a chance to look into his innermost self, to see himself, not as he appears in the eyes of his neighbours, but in his relation to great, ever-creating, ever-destroying Nature. No other circumstances favour an intimate relationship with Nature like this, the living free and alone among her works, without a house, without any vestige of human culture about the place, without any human society. The observing of animals and plants, the aesthetic pleasure I felt in watching land and water, rocks and trees, and their ever-changing hues and moods were my only enjoyment; but how much more intensely and purely did I enter into this than under ordinary conditions!

On first coming to Australia one is inclined to find the eucalyptus woods rather strange than beautiful, being used to admire in a tree its fresh verdure and its rich and dense foliage. The latter serves to give a relief to the tree, to make it stand out from among its environs and against the sky, to give it an individually distinct shape and character. The beauty of eucalyptus lies in another direction. If its foliage lacks force and freshness of colour, its mild tender tints produce charming effects in contrast with the more vivid green of the meadows, or the silvery sands of the river banks, particularly so when the whole scene is bathed in the slanting rays of the evening sun. The growth of the trees is always noble and stately, sometimes quite gigantic, but the narrowness of the leaves and their vertical position make the foliage seem much thinner than it really is, so that the appearance of the tree becomes less strong and vigorous than its size would seem to warrant. On the other hand, the tenderness and transparency of the foliage is hardly equalled by any other

tree, and once used to the peculiarity of its character I never tired of admiring the daintiness of its design. There are only two European trees one might compare with it—our birch in its spring garment, and the olive-tree. Both show something of the eucalyptus character, but on a much feebler scale, being puny dwarfs compared with the gigantic, though so exquisitely shaped Australian tree. It is quite an exception that the eucalyptus form handsome groups, and the endless park landscape with its isolated trees offers—so I must own—rather a monotonous aspect. The greater is the delight of the lonely traveller at the sight of a river bank, if on the height of it the beautiful blue-gums stand out like lofty sentinels. From afar he will see the shining white bark of their trunks, and their dainty crown of tender green leaves, the deep-blue sky shimmering through their foliage in a thousand little spots and dots.

Charming and picturesque is the sight of the silver-white bed of the river itself, its sides fringed with dense *Casuarinae* and tea-trees, its surface marked here and there by fallen trunks, stretching their branches like so many arms out of the water, in various and fantastic attitudes.

The water of the rivers, at all events during the dry season, plays a subordinate part in enlivening the landscape, except where wide water-holes or rapids, like those of the Burnett at Ideraway, give it a more prominent position in the scene. Wild and imposing, however, is the sight of the Burnett in times of flood, when its bed, even though it be more than half a mile broad, does not suffice to hold its overflowing waters. Then the river will come rushing along, foaming and bursting its banks, laden with uprooted trees, and filling the air with its roaring far and wide. All these impressions, however, are not such as to captivate a traveller at first sight, and force him to enthusiasm and admiration like the radiancy of Southern Italy, the severe grandeur of the Alps, or the luxuriance of the tropical forests. He must know them intimately before he will arrive at a real enjoyment of their charms. He who is sensible to the peculiar, and who enjoys to search after the beautiful, will find himself rewarded, and gather many a pearl amongst these remote scenes and sights. He, on the other hand, who is sensible to those beauties only which have been proclaimed to him as such from his childhood, and who will see no charm in a landscape devoid of picturesque form, vivid colouring, and luxuriant vegetation, will regard the Burnett district "a country as utterly uninteresting and monotonous as can well be imagined," an expression used by one of its describers.

Dry Channel of the Burnett My Encampment on the top of the Bank.

Poor Australia is often exposed to most unjust criticisms, sometimes in jest, sometimes in earnest. She is called the land of extremes, and reproachfully accused of having nothing just as it ought to be. Her climate, they say, is either too warm or too cold, too dry or too hot, her flowers without perfume, her birds without melodies, even her swans are black instead of white. But black swans may be also beautiful! And as to the climate, that of South and

Rapids on the Burnett, near Ideraway.

Middle Queensland is the finest and healthiest imaginable, though floods and droughts may sometimes inconvenience the owner of flocks and fields. And at times, when the melaleuca-shrubs adorn the river banks with their white, and the acacias deck the scrub with their yellow blossoms, the country is filled far and wide with the sweetest perfume. Singing birds like our finches, nightingales, and sedge-warblers you will indeed seek in vain in the interior of Australia. But neither will the coasts of tropical Africa, nor the woods of Ceylon and Java, the banks of the Ganges and Yumna, ever

offer you a birds' concert equalling that which can be heard on any fine spring morning or evening in our German woods and meadows, or along the banks of our modest streamlets. I, at least, have never heard the like anywhere else. But still within the Australian bush the morning is greeted by glad songsters, and one only has to rise betimes to hear them, since the sub-tropical sun, hastening towards the zenith, silences them earlier than the sun of our latitudes.

How oft was I awakened by the loud peculiar tunes of the "leather-head,"

Tropidorhynchus bu-

ceroides, of Ptilotis

and other Melipha-

gidæ. Really beauti-

ful, however, is the

joyous morning song

of a bird belonging

to the crow tribe,

Gymnorhina tibicen,

the flute-like notes

of which make the

silent bush resound

every morning. The

feathers of this bird

are of a deep black,

contrasting vividly

and agreeably with

the white design on

its neck, wings, and

tail. Like our jay

it is forward and

lively, not in the least

afraid of man. Its

food consists of insects, particularly of grasshoppers and locusts

of all kinds. But it will also attack small reptiles, and become

dangerous even to young nestlings. The song of the birds, taken

individually, is not equal as to melody and force. There are bunglers

and artists among them. Up to this day I can recall the tune,

which a particularly accomplished bird sounded every morning

close to my tent at the Auburn junction.

Australian Flute Bird (*Gymnorhina tibicen*)

Allegro

8



This charming melody, delivered with much fervour, and in clear perfect notes, and repeated with ever fresh enthusiasm, delighted me anew every morning, and made me love the joyous little songster.

For hours after sunrise the neighbourhood of the rivers and stagnant pools used to resound with the dull decoying call of long-tailed birds, called by the colonists bush-pheasants. They mostly keep near the ground, hidden among dense grass and shrubs. When scared, they fly clumsily to the low branch of some tree, and hopping from twig to twig take a long time to reach the top, whence they take flight. This bush-pheasant is by no means a pheasant, but a cuckoo, even though its call does not resemble the cuckoo's in the least. Real pheasants, as well as the real finches (*Fringillidae*), woodpeckers (*Picidae*), and vultures (*Vulturidae*), are quite lacking in the Australian region. The real cuckoo's call is, however, often heard in the bush, but almost exclusively during night-time, and is not produced by a cuckoo, but by an owl, the cuckoo-owl (*Spiloglaux boobook*). A wonderful country indeed! Her mammals lay eggs, her cuckoos look like pheasants, and her owls call out "cuckoo."

After sunset, sometimes even after the final setting-in of darkness, I used to hear a loud shrill call. Dahlke referred it to the Australian curlew (*Numenius australis*); but I never had a chance of shooting this bird.

The most singular sound heard within the bush is an infernal laugh, resounding near the river at sunrise and sunset with the regularity of a clock. Rare till now are the settlements of man within the bush, rarer still are churches and chapels, and never in these regions have I seen a church-clock or heard one strike. The "settler's clock" is a bird, the laugh of which opens and closes the day. Beside the just mentioned name, it bears that of "laughing jackass," whilst scientifically it is termed *Paralcyon (Dacelo) gigas*.

The laughing jackass belongs to the family of kingfishers, and is one of its biggest members. Unlike the common kingfisher, it seeks its booty on land, and not by diving and thrusting its beak into the water. The same habit I noticed in another kind of kingfisher inhabiting the Burnett region, *Todirhamphus sanctus*, whilst the handsome ultra-marine *Alcyon azurea* coincides in all its habits with our well-known European kingfisher. The laughing jackass is a great devourer of reptiles, not only killing lizards, small and big poisonless snakes, but even attacking the numerous poisonous reptiles of Australia, the "black snake" (*Pseudechis porphyriacus*), "brown snake" (*Dimenia superciliosa*), and the "death adder" (*Acanthophis antarctica*), the most dangerous of all. Both courage

and caution distinguish his mode of attack.¹ This part of the jackass's doings ensures him forgiveness, even though he happens from time to time to pounce upon a poor little chicken, and makes the heart of the housewife lenient towards these latter misdeeds. He is a cunning, acute fellow, full of humour, who follows the doings of men from the high standard of a eucalyptus with interest and benevolent condescension, and who occasionally accompanies his observations by a hearty laugh. This is so infectious that a second, a third, a whole dozen birds immediately begin to join in, and soon the silent bush resounds with a merriment you seldom hear outside a House of Parliament or a theatre, during the performance of a favourite comic actor.

Mr. M'Cord's visit to me was partly dictated by his wish to inform me that "mustering" had begun in Coonambula, and his desire to invite me to witness this interesting operation

Laughing Jackass (*Paralcyon gigas*).

whenever I liked. I took advantage of this friendly invitation several times in the course of the month, and also later on at other stations of the Burnett, and got well acquainted with the nature of these important proceedings, of which my readers must allow me to give them a sketch.

As already mentioned, the cattle are permitted to graze freely

¹ These birds have a particularly cunning way of mastering their victim. They catch the snake by the neck, fly up with it into the air, whence they drop it on the ground. Then they swoop down, catch it up again, let it fall once more, repeating this manoeuvre till the snake is quite stunned, whereupon a last *coup de grâce* puts an end to its life.

and without control in the grounds of the different stations, and midst so vast a number of animals there is no other means of manifesting your ownership than by branding the body of the beast itself. Accordingly certain letters are burned into the skin of the cattle, horses, and sheep, with a hot iron. The combination of letters has to be notified to the magistrate, and, every station having its own sign, it is easy to decide to whom lost or stolen beasts belong. The combination of letters, the so-called "brand," for Coonambula is "1CN" on the left side, besides which the birth-year of the individual is marked by adding the last figure of the year—1 for 1891, 2 for 1892, etc. At Coonambula they have also the custom of cutting a triangle out of the left ear of every animal, so that it may be seen from a distance that the cattle belong to this station and not to another employing a different ear-mark. The brand often becomes hardly visible, particularly when the hair of the animals is at its longest, and then the sign of the ear-mark proves very useful, though in itself it is not so sure as the brand. If at any time stock is taken, every animal that has been counted is shorn at its tail, to show whether it has been already mustered or not. This proceeding is called the "square-tail muster."

The process of mustering is this: in the neighbourhood of the station, and at some farther points (as, for instance, near Mundubbera) extensive yards have been erected out of strong beams, able to receive 500 to 1000 head of cattle. Into these yards a portion of the cattle are driven day after day, to remain there without food till the mustering is over. It is desirable, however, to release them after one or two days at the utmost, in order that they may not get unnecessarily exhausted by hunger.

When first nearing Coonambula during mustering time, I was at once struck by the cloud of yellow dust which lay above the plain on which the station stands, and by the dull noise filling the air. The dust was whirled up by the many thousands of hoofs of the cattle, which, closely pressed within the yards, kept anxiously stamping the ground and filling the air with their roaring. A strange and weird sight! For the special process of mustering, a certain number of cattle are driven from the big yard into a smaller one. Out of this little herd all those calves, which have received no brand as yet, are once more singled out and put into a still smaller yard. Here they get branded and receive their ear-mark, and the males are gelded, unless destined for breeding purposes. The smaller calves are simply thrown down and held fast at the legs by two men, while a third presses down the shoulder of the prostrate animal by his foot, and marks it with the red-hot iron. Older and stronger animals are not so easy

to find the "lasso" used for the capture of the free-roaming cattle in these parts, but only for the throwing down of stubborn horses or bulls within the yards.

Still more time and skill is required for the mustering of horses, which show infinitely more courage, vivacity, and cunning than the duller cattle. They are much harder to be caught, and when captured better able to extricate themselves than those clumsy creatures. The gelding of the young stallions has, moreover, to be managed with the greatest precaution, as the horse does not bear the wound so well as a young bull, and is of far higher value than the latter.

The animals mustered during the day are taken back to their pastures the same afternoon or evening. First they are led to the river or creek, where they enjoy the drink they have had to dispense with for twenty-four hours. The cows are given time to find their calves before the big herd is scattered once more, and then all are taken off to their pastures, which are sometimes ten or fifteen miles distant. A herd of 500 head may quite well be led by three or four men, two riding in the rear, the other two to the right and left, to prevent single animals from breaking out sideways or the whole herd from taking a false direction. If a group takes a sudden turn to the wrong side, the stockman seeks to drive it back by shrieking and hallooing, and, should this prove useless, he will ride in advance of it and gallop straight in its face from the direction it is taking. Particularly stubborn individuals will sometimes receive a chastisement by means of the mighty stock-whip, the lash of which has a length of four to five yards. The use of this instrument has, however, to be studied, and a beginner may inflict very painful strokes on himself, whilst an adept in the art is certain of hitting exactly the part of a beast he chooses. It is cheerful indeed to ride in the rear of a herd of cattle that is being thus driven along. The hallooing of the drivers, the merry galloping, the alertness necessary to keep the beasts in order, last, not least, the pleasure the horses themselves take in that sort of work, made this cattle-driving a thing of delight to me. The horses pay the utmost attention lest one of the cattle should be up to some trick and break away from the main body, and they follow the runaway with the speed of lightning, without the slightest prompting by their rider.

Of course the task of taking the cattle from one part of a run to another, which occupies at the utmost two or three days, cannot be compared to the difficulty of driving the enormous herds from the Burnett, or other places still more distant, to Sydney. The

speed must not be overdone for fear of exhausting the animals, who must always have some time left to graze at a certain leisure. During night-time the progress is interrupted, and while some of the drivers sleep, others watch the cattle and prevent them from getting scattered. In cases of nocturnal tempests or thunderstorms a terror will seize the animals, when, already excited by their strange surroundings, they dart away to the right and left like maddened creatures, no power of man being able to stop them. Those are bad times for the man in charge. Even if he succeeds in rallying the greater part of his scattered herd, he is not able to look after stray individuals for more than a few days, and must be content if the disaster pass without any too grievous losses. Although the task of travelling with cattle is no easy one, it is very much in favour and eagerly sought after by the younger and more enterprising colonists. Life during these journeys is free and unfettered, every day brings them among new surroundings, and their work is crowned by a visit to the metropolis. Here they play ducks and drakes with their newly-earned money, and return to the quiet bush richer in experience and remembrance than when they left it.¹

About the middle of October, I discovered with pleasure that an interesting marsupial, the native bear of the colonists, was about to rut, and that I might hope to set up a good embryological series of it. I deduced this fact from the anatomical examination of some specimens, and from the fervent cries of the male "bear," which at night-time, and also in the mornings and evenings, sounded far through the silent bush.

With the view of furnishing myself continually and conveniently with full-grown specimens of *Ceratodus*, I stretched a long stout string from one side of the Auburn to the other, in a place known to abound with fish. To this string I attached, at fixed intervals, lines with strong fishing-hooks, long enough to hang pretty deep into the water. Usually I kept about twenty of these fishing-hooks in action, baiting them with snails, worms, crawfish, meat, and, better still, with small fish. Every morning, noon, and night the hooks were examined, such fish as had been caught were secured, and the bait renewed. Besides, we used another method. A fishing-hook attached to a long line and weighted by a heavy stone was flung out into the river, and left at the bottom till either a fish has been caught or the bait has been eaten. In this way we caught many fish, numerous *Ceratodus*, many Percoids, and three kinds of sheath-fish, the "jewfish" (*Arius australis*), and two sorts of "catfish"

¹ "Overlanding" is not so much in use now as when the author was in Australia, owing to cattle taxes in Victoria, and to the extension of the railways in New South Wales and Queensland. (The Translator.)

(*Copidoglanis tandanus* and *Hyrtlii*). The fins of the latter are furnished with strong pointed spines, the sting of which produces violent inflammation. The spines of the pectoral fins possess in their joints a special mechanism, by which, if raised at the will of the fish, they remain in that position and cannot be pressed back. This contrivance gives them a splendid weapon of defence, and one does well to handle captured specimens with the greatest precaution. Our fishing was often disturbed by three kinds of tortoise very frequent in the Burnett district, *Emydura Krefftii* and *E. latisternum*, and the long-necked *Chelodina longicollis*, which cannot draw in its head *straight* under its shield, but has to hide it by bending the neck sideways. Specimens, with shields measuring 16 inches in diameter, were not rare on the Burnett. These turtles vied with each other in robbing our fishing-hooks of their baits. They were sly and clever enough to almost always avoid getting caught in the process, and it was quite an exception that they paid for their theft by their life. Dahlke declared to have heard that they would avoid baits of turtle flesh, and, in consequence, we began to use the latter, but were none the less robbed by the greedy cannibalistic reptiles, and we even caught some of them with the flesh of their brethren. Our table was richly supplied with fish at that time. Still it is remarkable, and was for us a great pity, that all the Burnett fish, with one exception, furnish a very indifferent food. This one exception is represented by a kind of mullet, *Mugil Cunnesius*, called by the blacks Ngaria. The handsome and lively creature, which attains a length of more than a foot, is difficult to catch, since it does not take the usual baits. Certain algae, however, which develop in the hot season in parts of the river sheltered from the rapid current, are in its eye the greatest delicacy, not so much for their own sake as on account of the numerous little water-insects which haunt the hairs of the plant. All those parts of the river which are rich enough in water to be accessible to the mullet, will soon be razed, while in the flat parts, which are inaccessible to the fish, the algae thrive most opulently. Here and there the water-current tears off a bunch of algae from these places and carries it down the river. One can easily see the fish assemble below such profitable spots and await the morsels which the current carries down to them. If you take your stand near a place of this kind—so that the fish cannot see you, they being quite able to observe what is going on above the water, and very much afraid of any shadow thrown on the surface—and if you bait your hook with a cluster of algae and let it float into deeper

water, you may be sure to catch a fish at each fling of the rod. At a particularly favourable spot I once caught twenty big mullets in the course of half an hour, and only left off because I did not know what to do with so many. When we had no algae, we secured this excellent fish by shooting it in the water with shot. This is by no means very easy, as one has to stand almost vertically above the water to get a successful shot, and is easily detected by the fish in this position. If the shot enters the water at an acute angle, it is considerably diverted from its aim.

Another quality of this famous fish is its wonderful skill in leaping. During the evening hours the mullets often dart out of the water to a height of several feet, apparently more for their own amusement than to evade pursuit or to catch insects flying above the surface. This talent for leaping is the reason why it is difficult to catch them with nets, which they simply avoid by jumping over. When disturbed, they produce a queer growling noise, and dart away with the rapidity of an arrow.

Now and then our baits of meat or mollusks attracted a *Ceratodus*, and this proved that the Australian lungfish is by no means a vegetarian, as has hitherto been thought. On opening the animal, the intestinal canal will indeed almost always be found filled with green vegetable matter, partly composed of leaves and blossoms of gum- and tea- trees, carried into the river by the wind, partly of genuine water-plants. But noting that *Ceratodus* took so well to animal bait, I grew doubtful whether the above-mentioned plants are eaten for their own sake, or for the sake of the many little animals: crawfish, worms, snails, shellfish, and insect-larvae, which they harbour. On examining the contents of the intestines, I found that the tough fibres of the plants are not digested, but leave the body in an almost unchanged state. They are, so to say, but the vehicles of the food itself, which is of essentially animal character. Quite tender plants, as, for instance, the filamentous-algae favoured by the mullet, may be digested; the firm and tough tissue of the higher order of plants, is, however, proof against its digestive powers. Altogether, I found that errors about *Ceratodus* abound in scientific literature, the principal reason for this fact being that the fish is confounded with another. The settlers call the *Ceratodus* the "Burnett Salmon" on account of its reddish flesh, and another fish, appertaining to the Fitzroy-Dawson, a river district north of the Burnett, "Dawson Salmon," on account of its taking the fly like a salmon. William Forster, the discoverer of *Ceratodus*, committed the trifling error of describing it as "*Burnett or Dawson Salmon*," and from this

one mistake there arose a multitude of others. The Dawson Salmon, *Osteoglossum Leichhardti* by its Latin name, is called Barramunda by the natives of the Dawson. This name was erroneously applied to *Ceratodus*, which is nowhere so called on the Burnett, where the natives term it "Djelleh." The fish was, moreover, considered an inhabitant of brackish water, while, on the contrary, it limits itself to fresh water, and keeps beyond the influence of the tide. False, likewise, is the statement that it will take the fly, and quite erroneous are the notions about its geographical extension. This was considered as comprising the farthest north of the Australian continent, regions which are indeed inhabited by *Osteoglossum*, but not by *Ceratodus*. The fish dwells exclusively in the two little rivers, Burnett and Mary,

The Lungfish (*Ceratodus Forsteri*).

neither north nor south of them, while the Barramunda does not extend further south than the Dawson. The watershed between the Dawson and the Burnett marks at the same time the limit between *Ceratodus* and *Osteoglossum*.

In former geological periods the genus of *Ceratodus* inhabited the wide world. Remains of its teeth have been found in Europe, America, Asia, and Africa, and fossil records prove that it extended over a far greater portion of Australia than nowadays. It is therefore very curious that the fish has survived only within these two rivers, the Burnett and the Mary, which show no essential difference from their neighbours to the south and to the north. What may have determined the extinction of the fish in those much greater rivers, what its survival in these two?

In the first place, one has to take into consideration the appear-

ance of an enemy, which may have destroyed *Ceratodus* in a number of rivers. Crocodiles are indeed found down to the Fitzroy-Dawson, but not further southward, and are entirely absent in the Middle Burnett and Mary. This might lead us to believe that *Ceratodus*, an uncommonly lazy and indolent fish, has been exterminated by crocodiles in the rivers north of the Burnett. Still its disappearance from the rivers south of the Burnett remains unexplained. In these it certainly existed formerly, and they contain neither crocodiles nor any other enemy that might have proved dangerous to the big-mailed Dipnoam. The circumstance that fossil remains of crocodiles and *Ceratodus* are found together in the Darling Downs, likewise disproves this theory.

To my belief, the explanation has to be sought otherwise, and I am inclined to see it in the great difficulty of the transmigration of *Ceratodus* from one river to another. The climate and meteorological conditions of Australia are such at present that a single drought of several years' duration can, and often does, exterminate all the aquatic inmates of a river. Few rivers have a lake-reservoir which they could feed upon in times of drought. The lack of water-treasuring mosses is likewise a prominent feature of the Australian bush. A drought setting in—and the short history of Australia tells us of periods, when not a single raindrop has fallen for three or four years in a district known as commonly subject to rains—a whole river area is liable absolutely to dry up, and its animals will be exterminated, with exception of such as withstand desiccation in either their fully-formed or embryonic state. To these latter *Ceratodus*, however, does not belong.

When the drought is at an end and the river fills with water once more, it will be peopled anew from the adjacent regions which have suffered less by the calamity. For though the droughts occur over extensive districts, their intensity varies locally.

Concerning the means by which fish are able to migrate from one river region to another, we can state the following as most conspicuous; firstly, a flood will enable the inmates of one river to wander to another in the neighbourhood of their respective sources. This is particularly the case when the sources lie in a tableland, and also with the tributaries near the mouth of a river. Secondly, the sea along the coast forms a passage for such fresh-water fish as can bear a passing sojourn in salt waters. Thirdly, some few fish (*Siluridae*, *Labyrinthici*) are capable of a journey across the country. And last, but not least, the transport of fish-eggs by water-birds and insects may be considered a means of their translocation from one

river-area to another. The carrying along of fish by storms and whirlwinds is so rare an event that we need not take it into consideration.

All these methods, however, which I have described as possible for the passage of fish from one river to another, are closed against *Ceratodus*. The latter avoids the river heads, and consequently there is no prospect of its migrating into another river that way. It is very easily affected by sea water, so that migration through the mouths of streams proves likewise impracticable. The journey by land is an impossibility for *Ceratodus*, and lastly, its eggs are extremely frail and tender, as I noticed hundreds of times. They do not bear the most transient drying. If the water, in which I kept the eggs for breeding purposes, became too warm, or there happened to be too many in one vessel, or if I did not take care to remove every dead egg immediately, all the eggs died off rapidly. This circumstance formed a great hindrance to my embryological collecting. Taking all this and the large size of the eggs into consideration, transport by water-birds and other aquatic animals seems excluded.

By all this we see that if *Ceratodus*, by some reason, most likely by prolonged drought, were exterminated in one river, it would have far less chance to recruit anew from a neighbouring stream than other fish. This is my own theory concerning its limited range of distribution in Australia. The diminution of the water reserves, which the Queensland rivers in geologic times possessed in the lakes and swamps of the Darling Downs, the greater chance of the streams drying out, and perhaps a general increase of barrenness, may have all played a part in the defeat of *Ceratodus*. Its survival in the Burnett and Mary rivers may be owing to the presence of some particularly extensive water-holes, and to some fortunate concurrence of circumstances that, from time immemorial, prevented its dying out. Should a particularly fierce drought dry up the Mary river to-day but spare some of the water-holes in the Burnett, the fish would become limited to the Burnett and remain so for an immeasurable time. If, on the other hand, a naturalist or private person were to take the trouble of depositing living specimens of *Ceratodus* in the middle course of the Brisbane river, I believe these would be sure to thrive splendidly, and soon cover the entire river system.

As already mentioned, I caught in the Burnett many specimens of *Ceratodus* with the fishing-rod, the ground-angle, and the trimmer-hook. On returning to the district the year after, I took a pair of big drag-nets with me, and tried several draughts, but with little

success. The blacks know the best method of catching the fish by the use of small self-constructed hand-nets. One of these they take into the right the other into the left hand, and shut in the fish between their semicircular frames. The fisherman begins by diving to the bottom of a water-hole, which he supposes alive with *Ceratodus*, and tries to make sure of the position of the fish by eyes, hands, and feet. The fish is generally found lazily lying upon the river bottom. Having thus ascertained its whereabouts, the fisherman returns to the surface to take breath, whereon he makes another dive, shuts up the fish in his net, and pulls it up. This method can only be used with an uncommonly dull, slow, and lazy fish, a character we may well give to *Ceratodus*. By exercising caution, one may even touch it under the water without its changing its position, and, even if disturbed by the touch, it will but swim a short distance with a jerk, when it will rest again and let you repeat the game. In this its behaviour very much resembles that of a newt. By means of its great strength it sometimes succeeds in freeing itself from the net, or in breaking the fishing-rod; once out of the water, however, it becomes perfectly helpless.

The circumstance that I succeeded in catching the fish by day and by night, in the morning and evening, proves it to be neither a day nor a night animal, and showed me that it seeks its food heedless as to the hour of the day. It is, however, very capricious as to taking the hook. Sometimes not a single fish was hooked for weeks, at other times several in the course of one day, and once, at the beginning of a rainy period, ten were caught during only two days.

Entirely false is the statement that it goes on land or crawls upon tree-trunks projecting from the water to sun itself. These are pure fantasies, arising from mistaking this fish for another, or originated by people who have never watched *Ceratodus*. In reality *Ceratodus* is more helpless when out of water than most other fishes, and incapable of progression. It is not even able to jerk itself on for a small space by its tail. A further fable, pervading all the literature about *Ceratodus* ever since its discovery, is the statement of its embedding itself in the mud during periods of drought.

Ceratodus has an ally in tropical Africa called by its Latin name *Protopterus annectens*. This is known to bury itself in the mud during the dry season, and to form a sort of cocoon out of its own slime. Thus protected from drying, it is able to outlive the drought, till the humidity of the first rain dissolves its cocoon and awakens it from its summer sleep. When Krefft, the first

describer of *Ceratodus*, examined it, he immediately detected its near affinity to *Protopterus*, and conjectured that the newly-found Australian fish might spend its summer in a similar way to its African cousin. What he expressed as a mere surmise, was transcribed by others as a positive statement!

As soon as I came to the Burnett, I tried to get acquainted with every detail concerning the fishes' summer-sleep, the supposed formation of cocoon and burial in the mud, for it seemed probable that the frequent drying up of the Australian rivers might cause it to adopt a method analogous to that of its African ally. But the result of my inquiries proved quite negative, and, on the ground of my own observations, I must absolutely deny the existence of a summer sleep and the formation of a cocoon.

All the year round *Ceratodus* can be caught with net or hook within the river. The time of the lowest water naturally coincides with the end of the dry season, and this latter with the spawning time of the fish. That it should simultaneously spawn and pass through a summer sleep seems, at least, improbable. Moreover, cocoons never having been found by the blacks, whose sharpened senses overlook nothing, we may definitely cast aside this hypothesis.

As aforesaid, *Ceratodus* is a representative of the almost exterminated class of *Dipnoi* or lungfish, that is to say, fish possessing gills by which they breathe like other fish, but also an air-bladder, the construction and function of which very much resembles that of a lung. What does *Ceratodus* use this lung for, since it does not go on land, and therefore is not forced to adapt itself to extra aquatic conditions of breathing and living like the *Portopterus*? That the fish uses its lung for breathing I noticed hundreds of times. Near the river area it haunts, one occasionally hears a dull groaning sound. This is produced by the fish, which comes up to the surface at certain intervals to empty the breath from its air-bladder and to take in fresh air. I readily proved *Ceratodus* to be the author of this strange noise, when later on I kept the fish alive in great barrels and self-dug water-holes. I then saw them appear at the surface every thirty or forty minutes and lift the tip of their snout above the water, at the same time uttering the afore-mentioned grunting noise. Still I was unable to make out whether it is produced by the expiration of the foul air or the inspiration of the fresh, and how or where it originates.

At the same time, like any other fish, *Ceratodus* makes use of its gills, and is by no means able to exist on land. If taken out of the water and prevented from getting back, its gills soon dry up and

the animal dies. Nevertheless its lungs are of great importance to the fish during the dry season, for when the water evaporates over a wide area, and the river gets reduced to some few water-holes, the dimensions of which naturally decrease from day to day, an immense accumulation of river-inmates takes place within these last havens of refuge. The water thus rapidly becomes foul and putrid by rotting animal and vegetable substance, and the fishes die in numbers.

Mr. W. B. Maltby of Gayndah told me that he had once emptied a big but not very deep water-hole which was approaching dryness. The little water at its bottom was filled with dead mullets, perches, and other fishes, and the whole was putrid with fish corpses. Some *Ceratodus*, however, which were contained in this pool were perfectly lively and at their ease, and not in the least disturbed by finding themselves among these most unsanitary surroundings.

This is the occasion when *Ceratodus* enjoys the advantage of its lungs. Not on land, not during a summer sleep in the mire, or in a cocoon are they most serviceable, but in an extremity of this kind, when they furnish the only means by which the fish manages to outlive the most unfavourable conditions of its native rivers.

The fishing lent some variety to my life, although it hardly served to bring me any nearer to my aim, the collection of developmental material. At the end of October I made a short trip to Gayndah, riding there by myself and leaving Dahlke in the camp. The principal object of this journey was the repair of the photographic camera I had brought from Europe, which had broken down entirely after only four months' use. I will not name its inventor for fear of doing him damage. I admit that such a cheap "detective camera," or whatever be its name, may render one good enough service in Europe or any civilised place; but for a traveller in the tropics, however, such constructions are worthless, and unless he take only first-rate instruments, he will experience a most unwelcome loss of time and money.

In Gayndah I examined my camera in company with Mr. Harmer, the blacksmith, and found that the poorness of my photographs was entirely owing to the flimsy construction of my apparatus. Mr. Harmer was generally considered a "handy man," a great complement in Australia, where almost every one is dependent on his own hands. All the settlers were wont to turn to him in difficult cases. He was not only a blacksmith but a maker and repairer of all sorts of instruments. He mended the carriages and coaches, which had become partly or wholly shattered by their passage across the rough

roads of the bush, he repaired watches, he was the photographer of the district. Called to the sick-bed of my camera, he sorrowfully shook his head, declaring that the feeble constitution of the patient did not allow of a favourable prognosis as to perfect recovery and lasting health. This expert opinion was very crushing, for where was I to find an equivalent, and what a pity should I be prevented from reproducing the curious landscapes and interesting scenes of the human and animal life surrounding me? Mr. Harmer, however, did his utmost, and I was enabled to start back to camp with a half-serviceable camera.

A few days after my return we met with a disagreeable accident. I have already described how we used to hobble our horses before allowing them to graze. They never moved far from our tents, and used always to return to them. Evidently the pasture in this spot was to their taste. One of our horses even experienced the joys of motherhood; old Nelly, Dahlke's steed, giving birth to a handsome and sturdy male foal. We christened it Starlight from the hero of an Australian bush novel, which was being much read at the time. As our horses seemed attached to our camp, we freed them of their hobbles and left them to graze at liberty.

In October heavy rains had fallen, the pastures became green and rich, and our horses began to assume a splendid condition. Foremost of all the pack-horses, spoilt by sweet indolence and delicious food, were up to any trick, but our riding-horses had not such a lazy time of it.

One day I remarked that two of our pack-horses crossed the river several times, and began to move away, grazing leisurely, in a northward direction. I drove them back each time, but neither Dahlke, to whom I communicated my observation, nor I believed the horses to entertain any wandering desire. The next morning none of our horses were to be seen, which did not astonish us, as they used to graze within a circuit of several miles around our camp. In the afternoon I fetched my horse for a ride, and found the whole party together as usual, save the two pack-horses which had shown such an enterprising spirit the day before. I searched the whole neighbourhood, but nowhere a vestige of them. I called Dahlke, the owner of the fugitives. He grew anxious and sought for them everywhere, but in vain. About three hours before sunset, Frank, who had been pretending to hunt *Echidna*, but was empty-handed as usual, returned from his rambles. We immediately sent him off for the horses, telling him that they had probably crossed the river and taken a northward direction. Frank followed their track a

long way, so he declared, for about six miles. Then came a spot where they had separated and each had begun to graze by itself. The whole matter was doubly surprising, as the two fugitives had never been very good comrades, and had only associated for this exploit. As it was growing too dark to follow the tracks any farther, Frank returned that evening without having achieved his object. Towards evening a thunderstorm was in the sky, and Dahlke watched the clouds with an anxious eye. A violent rain would be sure to efface the tracks and would put an end to any possibility of following the deserters. The danger of entirely losing them was, however, not too great, very few wild horses existing within the boundary of Coonambula, and particularly in these parts of the run. Had we been staying in the mountainous district east of the Boyne, in which I camped later on, the danger would have been greater, for there herds of wild horses abound, and if one's animal joins one of them it is sure to be lost.

The savage horse, called "Brumby" by the Australians, is excessively shy and cautious, it is perpetually on the watch, sniffing the air, and will dart off as soon as it perceives the whereabouts of man. When one of the brumbies begins to move all the herd follow, and so do the tame horses that have chanced to mix with this company. The principal damage done by brumbies is that they make tame horses run wild as soon as these get into their set. Therefore the squatters pursue and destroy them where they can. Should it happen that they catch a brumby, they will succeed in taming even an old animal, provided that an expert rider takes it in hand and breaks it in like any other Australian "buckjumper." The eminent caution and speed of the animals will, however, rarely allow a man to catch them. The only chance is to drive them into an enclosure or paddock, and so to stop their flight. Generally the squatters prefer shooting them. Very similar to this is the condition of the wild cattle. To approach them is likewise very difficult, as they withdraw into the most impenetrable valleys and scrubs when approached by man, for which reason they are always called "scrubbers." They, too, make tame cattle go wild as soon as the latter join their set, and for this reason the squatters try to exterminate them whenever they get a chance.

On the following day Frank brought back one of the horses, and on the day after that the other. The latter, a young and vigorous pack-horse of considerable value, had roamed a distance of 18 miles from our camp.

CHAPTER V

THE DEPARTURE OF THE BLACKS

I WILL not tire the reader by relating to him all my experiences in the Auburn camp. My collections made good progress, generally speaking. Numerous minor observations I will communicate later on in connection with the questions they concern. On the 4th of November I told Frank once more to investigate the big "water-hole" near the mouth of the Boyne, where we had first found such an amount of water-weeds, but which we had since searched in vain for *Ceratodus* spawn. It was near sunset when Frank returned, out of breath, bringing me three eggs surrounded by a gelatinous substance, which he solemnly declared to be those of *Ceratodus*. This, if genuine, was a glorious discovery. Frank affirmed it with the greatest energy, but, in consequence of many experiences I had with him, I did not trust him entirely. Next morning I took all the blacks to the place where Frank had found his three eggs, and we began a general search. It being now November, the temperature was warm, and the water most agreeable, so that even the blacks did not mind a prolonged stay in it.

The method of our search was as follows. After entering the water we carefully gathered as many water-weeds as possible, particularly *Lepilaena* and *Hydricilla verticillata*, and then waded to the shore or to a trunk lying in the water, there to explore our burden. This was done by carefully spreading it out and then examining it leaf by leaf, stalk by stalk, lest any egg, hidden by the meshes of the foliage, should escape our eye. These eggs are deposited quite loosely among the leafage, not stuck to the leaves like those of newts, or joined together in masses or cords like those of frogs and toads. Therefore, one has to be very careful in lifting out the plants, conveying them to the shore, and examining them, else the eggs will slip from among the stalks and leaves and get lost. Although twenty of us searched eagerly all day, we found but

twenty-three eggs, a poor result compared to that of my second stay on the Burnett. Probably all the spawn I found on this and the following day was produced by one female fish, which daily deposited a certain number of eggs in this very place. That the spawn really proceeded from *Ceratodus* I was able to establish, by examining some of the eggs which already contained embryos.

The diameter of the eggs, including their spherical investment, measures about a quarter of an inch. Individual differences in size are not rare. The eggs, when divested of their covering, also show considerable variation; but generally their diameter amounts to one-eighth of an inch. Outwardly they very much resemble those of amphibia, save that they are considerably bigger than the ova of most European frogs, toads, and newts. The gelatinous covering is clear and transparent, and hardly ever encloses green algae, so that the spawn is never found floating. The floating of *frogs'* spawn is due to the oxygen produced by the algae generally covering or imbedded in its mucilaginous investment. The colour of the eggs of *Ceratodus* is a greenish gray. One-half of the egg appears darker than the other, owing to a greater aggregation of pigment, a peculiarity also to be observed in the spawn of amphibia. The *Ceratodus* egg is of similar construction, and likewise turns its more pigmented pole upwards.

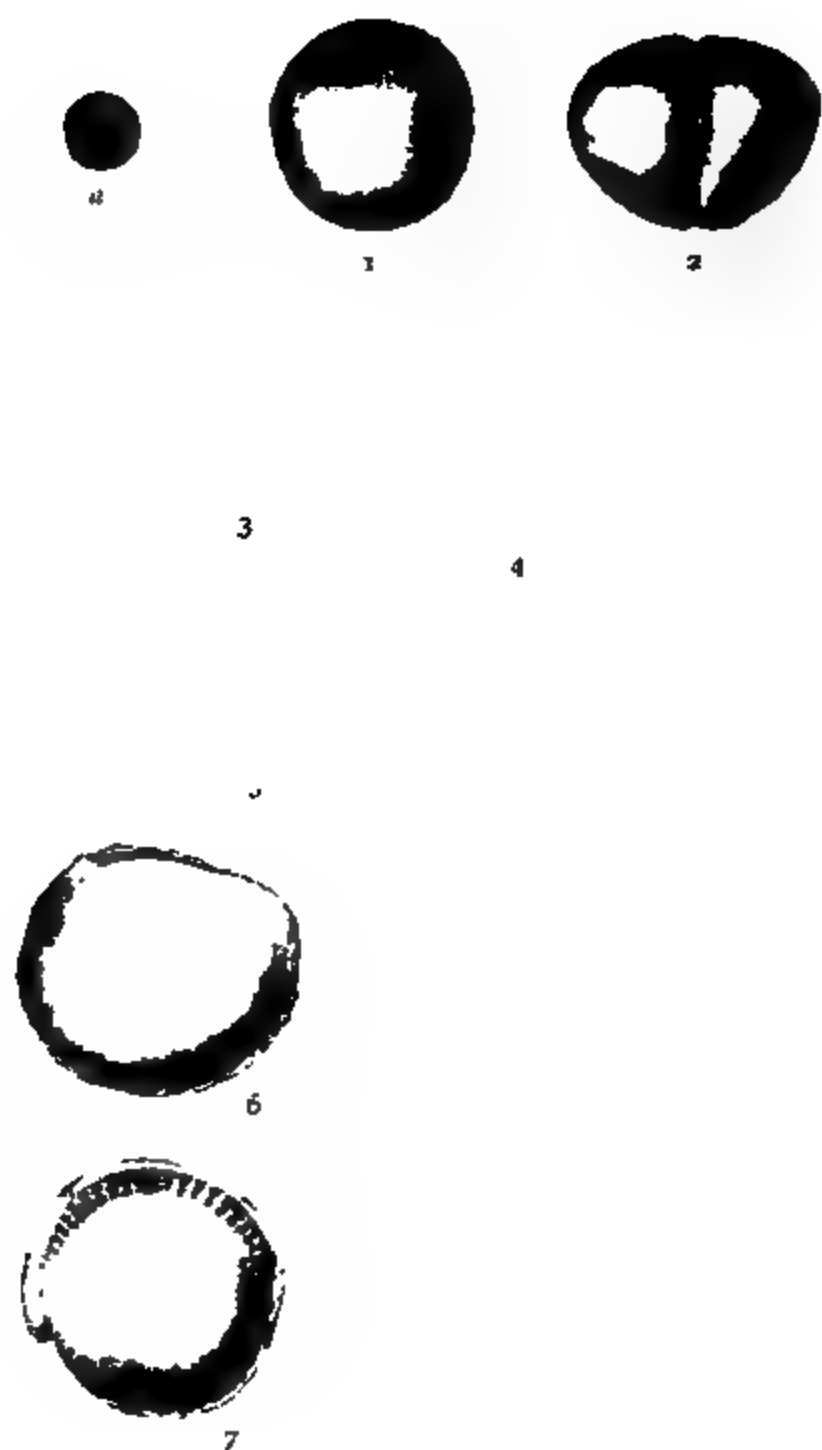
The eggs found by us represented different stages of development, which made it clear that they had been deposited at different times. Next day young and old searched eagerly for eggs once more, and found thirty-one, among them two, the embryos on which were ready to break their shell. I had great trouble in freeing the eggs, particularly the younger stages from their coverings without damaging their contents. At first a great part of our booty was destroyed in the attempt. Later I invented a better method by putting the still encapsulated egg for several hours into a preserving fluid till the interior had grown hard and resistant, and the outer covering had lost its elasticity, which made it possible to remove the latter without damaging the egg.

During this time I made numerous sketches of the living and the conserved material which I had gathered, and I was at once struck with the fact that the development of this fish bears a much closer resemblance to that of the amphibia than to any other fish. This circumstance confirms the theory, founded on the anatomical comparison of the developed animal, that we possess in the class of Dipnoi, and in its typical representative *Ceratodus*, a missing link between fishes and amphibians. The detailed consideration of this question, which I undertook after my return,

and the result of which I have partly published, has further confirmed this hypothesis. Of peculiar interest also is the development of its fin. Professor Gegenbaur has concluded from his investigations that the pentadactyle limbs of the higher vertebrata, amphibia, reptilia, birds, and mammals have had their origin in the fin of fish, the least modified type of which he is inclined to find in *Ceratodus*. To my disappointment I found the development of this animal's fin begins relatively late, when the body is far advanced in its formation. Two weeks after it has slipped from the egg we find the first vestige of its pectoral, and after another four weeks the first sign of its pelvic fin. As I never succeeded in catching the little fish free, but only those stages enclosed in the egg, I did not preserve all the collected material in its actual state, but reared some of the embryos in captivity. I had success only with a few, however, my material being much scarcer than I could have wished.

In spite of all my endeavours towards a more plentiful yield, our water-hole seemed determined to grant no more than about twenty eggs a day. I was still of opinion that the spawning time of *Ceratodus* was only just beginning, and forbade my blacks to catch any full-grown fish, and that least of all in the place where we sought the eggs. On Sunday, the 8th of November, the blacks were no longer able to resist the temptation to fish. They did so behind my back, and caught three strong males and one big female containing a great amount of spawn. From that day my source seemed exhausted; young freshly deposited eggs were lacking entirely, and only such as had been lying there since some time were found. At last nothing more was seen. On my inciting the blacks to a more zealous search, one of the women said to me, "Why should they look for the eggs any longer? The mother has been killed." In this way I heard about the disobedience of the blacks, but all my anger was too late. I have no doubt about the correctness of the black woman's statement. All the eggs we had found originated from the one female fish killed on the 8th of November, which had been up to that day depositing them day by day within the circuit of our water-hole. Jimmy had once noted some fishes swimming about among the water-weeds in an almost playful way, different from their usual fashion, and these were probably a female, which, followed by several males, was occupied with the distribution of spawn.

Our experiences of amphibia have taught us that eggs with a mucilaginous covering, which swells in the water, have to be impregnated before the covering swells, that is to say, before they touch the water. The impregnation has, therefore, to take place



Development of *Ceratodus Forsteri*. a, Egg in gelatinous covering (natural size),
1-13, Successive stages of development (enlarged).

within the oviduct, as is the case with some tailed batrachians, or in the moment of the egg's quitting the animal, as with frogs and toads. I am not able to state with certainty how the act of impregnation takes place with *Ceratodus*. Numerous reasons, however, which I need not specify in this place, and a comparison with the American lungfish *Lepidosiren*, the pelvic fin of which shows a curious transformation, lead me to suppose an internal act of copulation by help of the male's pelvic fin as the most probable solution.

Mr. M'Cord told me that he had heard from one of his men, called Sairie, of a place in the river, somewhat below Mundubbera, said to abound with water-weeds. I resolved to see for myself, to ride there with Frank on the 19th of November, search the river throughout the day, and return to my camp in the evening. The spot was about twelve miles from my camp, therefore it was best to start at sunrise, so as to have ample time for the search. Early that morning I rose, got ready and had breakfast, while Dahlke fetched and saddled my horse. But where was Frank? We called out for him to the blacks—no answer. I sent Dahlke over, who returned after some time, saying, "Master Frank will not come until he has finished his breakfast." I now lost my patience, walked over to the camp, and addressed the bold fellow in the fashion his insolence deserved. He listened sullenly, and then said, "All right, then I will go." This announcement did not move me. Though he had proved useful in several respects, and had been the first to show me *Ceratodus* eggs, he was still a great good-for-nothing, of no use in the more laborious capture of animals, quick of tongue and slow of action, so that I regarded his forsaking me in the light of a good riddance. Consequently I quietly answered, "You may go," whereupon he said, "All right, but then I will take my mob with me." "If they want to, they may go as well. But now, off to Mundubbera." During this ride I was plagued by black thoughts. It seemed very probable that Frank would carry out his threat, and rob me of all my blacks. Not that his personal influence over them was so great. They fathomed his boastful nature as well as I did, and were liberal in their jests concerning it. But they themselves were tired of this sort of thing. The great rum affair at the beginning had excited their discontent, and the sameness of their occupation, the perpetual searching for animals, began now, after three months, to pall upon them. Restless and capricious by nature, they had enough of the whole affair. The squatters have the same experience when they take blacks into their service at mustering-time. They will do their duty for about two months; then, however, regular work

becomes disgusting to them, they long for liberty and change of place, and will give up the most agreeable material conditions to take up once more their primitive life in the bush. This results from their perfect independence. Whatever they want is supplied by the bush without their sowing or reaping. They can at any time kill as much game as they wish with their spears, clubs, and boomerangs. Some pieces of bark, joined at random, will serve them as a dwelling, and protect them from wind and weather. The ragged clothes they have adopted on the Burnett will last them for years. They are not at all inclined to sacrifice their personal tastes to the sway of the settlers, and these are often heard to blame them for their "independence." I must own that I rather admired them for it, although their perfect freedom from want is the main reason why all well-meant efforts of educating these blacks have hitherto failed. The same experience has characterised the case of the North American Indians. These races do not bow before the advancing European, but die away by his contact.

In my opinion the slightest impetus would suffice to turn off the whole mob, and I was sure there would be no holding them if Frank once tried his powers of persuasion. Coaxing them to remain would have been a great mistake. Even did I succeed at first, they would have kept threatening me with their departure, and would have worked less than before. Still less inclined was I to make advances to Master Frank, as, for instance, to pacify him through the instrumentality of Dahlke. This I should have considered unworthy and by no means productive of good results. So I resolved to let things take their own course.

The spot mentioned by Sairie did not contain any spawn, not even water-weeds, and I do not know what can have induced that short-sighted man to make the above statement.

On my return at night, Dahlke instantly received me with the news that all my blacks were going to desert me. When starting on our ride in the morning, Frank had called out some words to them which had acted like magic. In the evening the whole lot were most gay and jolly, and we heard them laugh and sing in their camp till far into the night. Like children, they were looking forward to payment next morning, and to the cash they would once more be allowed to grasp. I saw that there was no chance of keeping a single one with me at present. Jimmy, who had brought me the most numerous and precious material during all this time, received a £1 note according to promise, as did Frank, for having found the *Ceratodus* eggs, and each of the rest had his due as well.

Then they started, and at noon their camp was deserted, save by a mother-dog that had whelped a few days before. The blacks had tried to take her by force, but she must have flown from them, for in the evening she was again with her puppies.

Aggravating as was the desertion of the blacks, I thoroughly enjoyed being rid of their dogs. Every black family possessed a mob of horrid curs, of good service only in hunting. They were partly tamed dingos, taken from their mothers as puppies and reared by the blacks. But the greater number consisted of a cross-breed of dingos and the dogs introduced by the whites. These cross-breeds are not quite so wild, untamed, and thievish as the tamed dingos, but, nevertheless, a pack of vagabonds most unwelcome as neighbours. They kept continually stealing about our camp, and everything eatable we had fell a prey to them, circumstances so happening that as Dahlke and I were often absent from the camp at the same time, nobody was present to drive off the bold intruders. Whenever we could, we gave the scamps a good reminder with a well-aimed stick or log, but this was of little avail. We would have much preferred simply to shoot the boldest robbers amongst them. This, however, was out of question, as the blacks would have instantly deserted me had I shot their dogs. So we put all our eatables in sacks and hung them up on trees, checkmating our enemies as far as possible in this and every other respect. At last I had a brilliant idea. I loaded a number of cartridges with salt, and as soon as a dog appeared within the neighbourhood we stalked towards it till within shooting range, and fired off our charge of salt on its haunches. This cure, innocent as it was, proved radical. Any dog that had once received its charge of salt, never trusted itself near the camp any more.

Now silence once more overspread the place, but yesterday ringing with noise, laughter, and discord. Only the poor mother-dog came dismally whining to our camp, where we granted the forsaken creature the remnants of our meals.

I meanwhile dejectedly resolved within my mind what course to take. To engage other blacks would have been impossible, for they held together like burs; besides, they were very scarce in those parts. The best thing seemed to me to engage some white men, and in company with them to exert all my energy to find some more *Ceratodus* spawn. I immediately sent Dahlke to Gayndah to muster somebody there. During the week of his absence I was all alone in the bush. Every trace of the blacks had disappeared. I spent this time in prolonged rambles along the rivers, rarely passing

the night in my camp, but mostly in some place where chance had led me. Everywhere I searched for the eggs, and as the water was at that time agreeably lukewarm, I led a half amphibious existence, which, on the whole, agreed with me very well. Only my feet got over sensitive and tender by my remaining for hours in the water, and were the more liable to wounds and scratches from the sharp river gravel. I benefited henceforward in this sort of work by using a pair of old boots. Another nuisance was the burning sun upon my bare back, which was soon scorched by its rays, pouring straight down from the zenith. It was not easy to protect myself against this, for whenever I put on a light jacket this soon got wet by my going deeper into the water, and brought on a disagreeable feeling of chill as soon as the slightest wind arose. I therefore gave up protecting myself against the sun, and soon had the satisfaction of finding that my back and breast got covered by a dark-brown skin impervious to its attack.

While I waded about in the water doing my work, I used to be the object of curious and suspicious observation from the numerous long-legged and long-beaked storks, which seemed to stand on guard near the river and to reign over the rest of the birds.

Nearly all of them are fine creatures of handsome colouring, above all the gigantic crane of the colonists, or "Jabiru" (*Mycteria australis*), which is, however, very scarce on the Burnett. Its head and neck are of a glossy green, and have a metallic glitter. The crown of the head shows beautiful iridescent tints of violet and purple, its back, tail, and greater wing-coverts are green, with a splendid golden lustre. The smaller wing-coverts, lower part of the neck and back, and upper part of the breast are white, as are also the inner parts of the wings. Its large beak is black, the long legs of a bright red colour. There is no other member of the order of storks comparable to the Jabiru in its combination of grace and elegance and the splendour of its appearance. I have only been able to watch a single living specimen, which did not, however, allow me to come within shooting range. The bird offered a glorious sight as it flew off, its bright legs stretched out behind it, its splendid wings, white on their lower, golden green with a white spot on their upper side, flapping and gleaming in the sun, with a metallic effulgence reminding me of a peacock. Later I saw a stuffed specimen in Eidsvold, which had been but shortly killed. Our zoological gardens sometimes house an African relation of the Jabiru, the *Mycteria senegalensis*, which is also a very fine bird.

Much more frequent on the Burnett was the "native companion" of the colonists (*Grus australasiana*), a very handsome creature of silvery-gray plumage. Also the fine Australian spoon-bill (*Platalea regia*) is no rarity. Genuine herons are found anywhere about the rivers, ponds, and swamps, where they follow their habit of fishing in solitary grandeur. They are closely related to our European kinds. These birds and I were no great friends, on account of their so often disturbing me in my pursuit of wild ducks and geese. Many a time when I had stolen up to my game, creeping along on all fours and using the utmost precaution, and had just come within range of shot—when I had at last attained a favourable ambush, where the ducks on the water could not perceive me—a heron, sitting on his tree-top, would all of a sudden espy me and fly off, taking ducks and geese along with him. So all my trouble had been in vain, and salt meat once more reigned in our bill of fare, instead of the desired roast.

Any one will understand that my feelings towards these mischief-makers were not friendly, and that, in seeing birds of prey describe their circles above my head, I sometimes wished they would make a descent upon the heron folk. There was the strong, bold, and rapacious *Aquila Uraetus audax*, similar to our golden eagle, but still handsomer and more elegant. Whenever it flew low above the river, a flock of little birds used to follow it, twittering aloud and quite beside themselves with excitement. The majestic bird did not seem to notice the little screechers, although they undoubtedly spoiled its chase. Often I also watched genuine falcons (*Falco melanogenys*) and hawks (*Astur approximans*). A pair of the latter must have had their nest near the station of Coonambula, and often paid a visit to the poultry-yard. Mr. Peile and I tried to shoot the bold robbers; but they never let us come to shot. The terror of the small birds, from the quail down to the tiny and graceful Amadinae, is *Accipiter torquatus*, the Australian representative of our European sparrow-hawk. More remarkable still than all these birds of prey is a splendid snowy-white hawk, *Leucospiza Novae-Hollandiae*, which is no albino, but only a white variety of the gray *Leucospiza raii*.

On the 27th of November Dahlke returned, telling me that he had engaged two men, viz. one of his cousins, Hermann Wein, and a friend of the latter, Fred Horn. Both were the sons of German parents, both born in Queensland and quite Australianised. In the evening of the same day the young men themselves arrived, and at the same time a messenger from Coonambula, asking me whether

Mr. M'Cord, with his family and some friends, might come to see me in my camp the following day. Of course I was very happy, and indeed it was particularly lucky that these visitors should come now that I had some people with me, and was not alone in camp. The whole of the next morning we made our preparations ; we shot ducks, squatter-pigeons, and scrub-turkeys, and caught some mullets. In mad haste we baked a fresh damper and a brownie, and so I was able to lay before my guests an ample bill of fare, the more so as Dahlke had brought with him from Gayndah all sorts of good things, also some jam and a basket of new-laid eggs. As to a tablecloth and some knives and forks, I should have been at a loss, had not Mrs. M'Cord's housewifely spirit provided these luxuries by bringing them in her buggy.

Knowing that my friends could conveniently only reach the opposite bank of the river with the buggy, Dahlke and I quickly built a rough bridge across the nearly empty Burnett, by felling some trees and taking them to their place in the water on our pack-horses. The bridge, which we called "Lady's Bridge," is depicted on the next page.

At half-past eleven our visitors arrived, in the buggy and on horseback, a big party, consisting of five grown-up persons and four children. Mr. M'Cord had brought two squatter friends, who were just then staying at Coonambula, Mr. Phil Elliot from Ban-Ban, and Mr. Humphrey from Mount Debateable. We had a very merry dinner in our arbour, my cookery again bringing me the greatest applause, particularly from the children. Afterwards there was fishing in the river. I had beforehand promised my guests that they could catch as many mullets as they liked, knowing as I did that the delicious fish used at that time to take filamentous algae very readily as bait, if thrown to it in certain places I knew. My prophecy of a good take proved false, however ; the clever fishes, disturbed by the noise produced by the company, by the shouting and running up and down of the children, quitted their usual ground, and the entire catch consisted of four mullets and some smaller fish. Early in the afternoon my visitors left me, a thunder-storm threatening after the sultry day. During the night it broke, and through the thundering and howling of the tempest I heard immense quantities of rain rush down upon the fly of my tent. In the morning early the rain abated and the weather seemed to clear. After breakfast the four of us rode down to the Boyne, and with combined energy set about our accustomed, but, alas, so inefficient task of egg-gathering. Hardly had we undressed and entered the

water, when the storm began anew, and grew to such vehemence that quiet work was soon out of the question. In pouring rain we returned to our camp. Rain in the evening, rain at night, rain the next morning! So things went on all through the following week. Though the force of the rain seemed sometimes to abate and a turn towards the better appeared to set in, this improvement was never lasting, and four dry hours used to bring on twenty of pouring rain—rain in all varieties—from the usual kind to the regular torrent.

During the first days of this calamity we were able partially to continue our work. Fishing was even ample during the first two days, when we caught ten *Ceratodus*, as many as we hitherto used to catch in the course of two weeks. But as the rain continued, the fish left off taking the bait.

By an examination of its internal organs, I had already ascertained that the rutting-time of the native bear, *Phascolarctus cinereus*, was near at hand. I now shot the first pregnant female, and resolved to concentrate my energy on obtaining a complete series of the stages in development of this most interesting marsupial, the more so as work in the ever-rising rivers was growing impossible.

The native bear of the Burnett, called "Gulla" by the blacks (in the dialect of the south of the continent it is termed "Koala," which, is in some handbooks declared to be the "native" name), is an exclusively arboreal animal. Its food consists of eucalyptus leaves, and it only descends to the ground in order to move from one tree to another, which it is often enough forced to do, since the trees in the Australian bush stand far apart.

While other arboreal marsupials like *Trichosurus*, *Pseudochirus*, and *Petaurus* hide during the day in hollow trees, where they also seek refuge when pursued, *Phascolarctus* does not make use of such hiding places. It is too strong and wary to fear the attacks of smaller birds of prey or of the rapacious native cat (*Dasyurus*), and perhaps also too large to find a hiding-place of sufficient size in a hurry. When not in search of food, it sits among the foliage and easily escapes observation on account of its gray colour. It is by no means exclusively nocturnal. I saw it climb about the eucalyptus trees in the daytime, apparently preferring the blue-gums on account of their position on river banks and near ponds and swamps.

During rutting-time the males cry out in far-sounding sobbing tones, more frequent in the evening and at night, but to be heard also during the day. The rut begins on the Burnett at the end of

October. But only in the middle and end of November did I find the first pregnant females. It seems the rule that only one young is produced at a time. This is born, after a short bearing period, in a very undeveloped state, and goes through its further development in the pouch, attached fast to the teat. The mother bear carries it about with her for a whole year, till she becomes pregnant again. When it is a few months old, the pouch becomes too small for its permanent abode, and it begins to seek other food besides its mother's milk. It is now carried on the parent's back, but at first it returns to the pouch whenever danger threatens. Whereas I had spared the native bear up to this time, I now began to pursue it eagerly, and, for instance, once killed twenty-three specimens of this animal in a day. As a rule, they sat so high up on the trees that it was impossible to distinguish the males—which did not interest me—from the females. Besides a considerable number of marsupial young in all stages, I acquired a small series of younger embryos. The first embryonic stages are passed through so rapidly that there is much less chance of finding them. Nevertheless, I found some few specimens, and their examination furnished interesting results, especially as regards their foetal membranes.

CHAPTER VI

THE FLOOD

ALL this time it was raining day by day, and for the most part throughout the night as well. The rivers began to rise in a most uncomfortable manner. Whereas in normal times we were able to cross the river on foot and on horseback, and only the larger water-holes showed depths of from 6 to 12 feet, the water had now risen several yards and still kept rising. My men, being acquainted with the situation, shook their heads and said, if the rain did not cease very soon, we should have a regular flood. The rivers would come down with terrible force, and sweep away every vestige of water-plants. These latter, were, however, the only means of finding *Ceratodus*-spawn. I still had hopes that the weather would take a favourable turn, and, indeed, for a time this seemed so; but although the rain abated, the rivers still rose. Till the 4th of December we had only noticed an increase of the Burnett, while the Auburn and the Boyne had shown no remarkable change. This, however, set in all of a sudden, as soon as the water-masses, arising from the plentiful rains which had fallen about the sources of these rivers, came down to us, and at once the whole broad river-bed, usually presenting a stretch of silvery sand dotted with thickets of tea-trees and river-oaks, became one sheet of water. The distance from the bottom of the valley to the top of its banks was about 70 feet in the neighbourhood of our camp. While we generally saw the water deep below us and had to carry up our buckets panting, it now came to meet us at a terrifying rate. Almost every day I was able to record an advance of 3 to 7 feet. The Auburn had become a real torrent, which was quite covered with logs and trees that had been uprooted and swept along in its wild course. This phenomenon, the immense amount of wood borne by the Australian rivers in flood-time, is very characteristic, and arises from the growth of certain trees—*Melaleuca*, *Callistemon*, *Casuarina*—in the usually empty river-bed. During

every flood a great number of these get uprooted and carried off ; a lesser number cling to the soil, until a later flood makes a victim of them as well. In flood-time the rushing of the wildly swollen streams, the grinding noise produced by the trees rubbing against each other and the banks, fills the air far and wide. By the action of these powerful planes the river-bed gets polished and widened, the river-ground thoroughly changed, old water-holes become filled with sand, fresh ones are opened, and banks of newly deposited sand arise. The sight of these wild streams, rushing and darting along, covered with mighty trunks, is most imposing and impressive. I, however, was not in the mood to appreciate the grandeur of the scene just then, this intermezzo not only forcing me to inaction, but threatening to overthrow my fondest plans. And also in another regard, the situation began to be uncomfortable. Hitherto we had been able to swim through the river on horseback, and thus procure meat from Coonambula. This now grew impossible, as neither man nor horse would have been able to cross the raging floods without being swept away and crushed by the trees whirling along the waves. Consequently, we had to resign ourselves to being cut off from the world, and had to begin to handle our only food, the salt meat, rather sparingly.

Halfway up one of the banks of the Burnett there was a little pool, that seemed to have remained there from the last flood. I had remarked that this pond had begun to dry up during the drought, and had established a number of *Ceratodus* within it, on purpose to watch how they would behave when their dwelling-place should begin to exsicate. Although the water of this pond had sunk down to one foot, not one of the fish attempted to imbed itself in the mud and form a cocoon, as the African lungfish *Protopterus* would certainly have done under similar circumstances. To my disappointment the rains prevented me from completing the experiment. One night the water rose up to my little fish-pond, flooded it and released the prisoners.

I had great trouble likewise with the disposal of our little dug-out boat. The banks were too steep and broken to allow of our drawing it up to the top, so we had to leave it in the water. As the rivers rose every night to such an extent, we could not, of an evening, fasten it at the level of the water, but were obliged to tie it to a long rope, which we attached many feet above the water-level for the time being. Before using this precaution, we were very near losing our boat, just then so valuable.

The improvement in the weather did not last, and from the 10th

of December the rainfall set in worse than ever. While at first, after the introductory thunderstorm, it had borne a quiet though obstinate character, it now came down in the form of terribly violent storms. On 10th December we had three bad thunderstorms in the course of the day, and two at night. My mood, already depressed by the forced inactivity and doubts as to the possibility of attaining my ends, now fell to freezing-point. At night there was little sleep, for I kept listening to the music of the rain, pattering down upon my tent, to the howling wind, and the crashing thunder. Amidst this symphony of different and most discouraging melodies, I suddenly heard a violent crack quite near, and, at the same moment, felt my tent sink in a heap all around me. Fortunately, a little space in the middle was spared in the general downfall, this being the very spot where my stretcher stood. For a moment I remained motionless, trying to make out what had happened, then, with the utmost trouble, I crawled forth from under the dripping sheets, and saw that the middle cross-beam of the tent, that bearing the roof itself, as well as the protecting "fly," had broken right through, thereby causing the collapse of the whole edifice.

Some time previous I had observed that a fine sawdust used to descend from the roof of my tent, and discovered that it originated from small holes in the framework. On closer examination I found at the base of each of these little holes a tiny beetle, eagerly at work in the wood. On my directing Dahlke's attention to the little labourer, he angrily exclaimed, "So that lazy Frank has really taken beams from the Moreton Bay ash, in spite of my strict orders to the contrary." He then explained to me that, whilst all the other acacias and eucalypti are spared by the wood-beetle, the timber of the Moreton Bay ash is alone subject to its attacks, and is, therefore, never used for the manufacture of tents or tools. Later on I had occasion to experience what terrible destroyers these tiny fellows can be. Some cases made of European pine and containing European alcohol were perforated by the beetles till they resembled sieves, and became perfectly unavailable for the transportation of preserved specimens to Europe. The timber of our European trees is not so well protected against this formidable enemy as that of the Australian eucalypti and acacias, with the exception of the above-mentioned *Eucalyptus tessellaris*, and some few others. How often is it to be observed, both among animals and plants, that the more formidable the arms of the assailants grow, the stronger and more powerful become the weapons which the individuals exposed use in their defence. The most ferocious thorns and spines

protect cacti from destruction by the wild quadrupeds of their desert home. Protective mechanisms of a complicated order are found in a number of plants, which would otherwise be endangered and perhaps entirely destroyed by the attacks of ravenous snails. Sometimes the protecting factor consists in poisonous and badly tasting substances, sometimes we find a direct mechanical protection by means of pointed crystals of oxalic acid, lime, or other deposits in the green parts of plants. What kind of protection Australian trees possess against the greediness of these beetles, I have not yet found out. It is, however, a fact that most kinds of timber remain quite unmolested by it.

I spent the rest of the night in another tent, and repaired the damage next morning. We began at the same time to submit the trees growing in our neighbourhood to a closer examination. During such a period of rains and tempests, it is not rare that old trees break down by the violence of the wind, crushing in their fall any human creatures and dwellings that happen to be at their foot. Therefore, it is always wise well to examine the trees about the camp, and to erect the latter, if possible, in an open space or in the neighbourhood of young and healthy specimens, felling any tree that appears unsafe. Not only will the complete collapse of a tree endanger a camp, but, owing to the gigantic dimensions of eucalyptus, the fall of a mere dry branch may cause considerable damage.

All the while our provisions began to ebb in a lamentable degree. We lacked meat for several days already, and now our tea began to grow scarce. For the present, however, it was impossible to cross the Burnett or the Auburn, even on horseback, on account of the tremendous quantity of timber rushing along the waves. The Boyne, however, seemed less swollen than the other rivers, probably on account of its having rained less in the regions round its source. Consequently, there was a possibility of riding along its banks, in order to cross it at a convenient spot, and thereby reaching Cooranga. The most natural thing would have been that one of my men should have undertaken this task. Dahlke would not have wavered a single moment. Having, however, seriously hurt his pelvis the year before by a fall from his horse, I would not hear of his exposing himself by a swim through the swollen and dangerous river. My two other men declared themselves unable to swim, so I dare not ask them to cross the river on horseback, consequently I myself undertook the honourable but not over-convenient task of procuring our provisions during the next fortnight. On the first

day I had no great difficulty in reaching Cooranga, where Mr. Turner gave me the comforting assurance that this was only the beginning of the rains, and that we should have twenty times as much water. According to him, it rarely rains in Queensland ; but if once it does, there is no saying how long it may last. While he was in this way raising my sunken courage, the sky filled with clouds once more, and there set in a whirlwind accompanied by an immense discharge of electricity, a thunderstorm of indescribable violence, followed by a tremendous hailstorm. Two hours after, all was over, and I was able to start for my camp. Now I saw what mischief a true Queensland thunderstorm is able to effect. For miles and miles along my path all the weaker and less sturdy trees were broken, their boughs torn off and strewn far about. The whole looked like a heap of ruins, and to ride along these parts, while the storm was displaying its powers and passing muster over the sons of the wood, would have brought certain destruction.

Directly after my visit to Cooranga the Boyne began to rise, and soon reached such a height that it grew just as impossible to cross as the Auburn and the Burnett. At the same time the space between the water and our camp had shrunk to ten feet, and I began to consider whether we ought not to move to some place farther up. The aspect of the Burnett at this period was that of a gigantic stream of nearly a mile in breadth and about seventy feet in depth, the muddy waters of which, with its loads of drift-wood, rolled along with immense power and rapidity, the air perpetually resounding with the rushing, grinding, and foaming of the raging river. At this point, however, the flood had for once reached its climax. Rains and thunderstorms did not indeed cease at once, but they became less frequent and violent, and the rivers that had risen so rapidly, began slowly to fall. Whereas till now the whole extent of the rivers had been covered with trees and drift-wood, this gradually began to diminish, and one might think of crossing the water without too imminent danger to one's horse or to one's self. I myself executed this feat repeatedly, and chose for crossing a certain spot on the Auburn very near its junction with the Burnett, on account of its being less rapid there than elsewhere. Dahlke took my clothes and the saddle across to the opposite bank in the boat, while I mounted my horse and drove him through the river by spurs which I fastened to my naked feet. Unhappily there was not a single good or ready swimmer among our riding-horses. Shaml showed the greatest antipathy to water ; he reared, kicked, tried to bite, and did everything in his power to enter a protest against so

unreasonable a demand. The other riding-horses seemed no better, and so I had to force Shamyl into the water without mercy, by means of my spurs and whip. As soon as he lost ground his resistance ceased, and his endeavours were concentrated on nearing the opposite shore. He had, however, the queer habit of keeping his nose below the water as long as I sat on his back, and twice he was on the brink of getting drowned. When I noticed that his stupidity was endangering his life, I slipped off his back and swam alongside him, whereon he took his nose out of the water, and paddled on with the greatest effort till he reached the shore. The want of a good swimming horse made itself felt very sorely at that period, and I begged Mr. M'Cord to lend me one. Later on we found out that one of our own horses, called "Big-Nose" on behalf of his queer physiognomy, was an excellent and fearless swimmer, a horse we had never thought much of, and which we had not even given a trial.

At this period, when the crossing of the rivers was difficult for all travellers, and quite impossible for some, several people, most of whom were on their way to Eidsvold, were stopped on their journey, and the existence of my camp having become known all about the neighbourhood, I soon had a little assemblage of guests in my tents. Great as was the difficulty of getting food for ourselves under these circumstances, I was now expected to provide for a number of strangers besides. Ready as I was to offer them hospitality, I made a point of their leaving me as soon as the passage was practicable, and of their continuing their journey directly the Auburn could be crossed. This was made possible by a temporary sinking of the water several times during this flood-calamity. One old vagabond, however, a tramp of more than ordinary size and weight, whom we dare not trust with either our little boat or with the back of a horse, had to be kept and fed for more than three weeks running. Steady scientific work was of course impossible during all this time.

Whenever the weather allowed, I wandered about to shoot *Phascolarctus*, and I also killed and skinned several birds. Till then I had not occupied myself with this sort of work, the shooting and skinning of birds demanding a considerable amount of time.

As regards beauty and colour, the Australian birds can rival any other ornithic fauna in the world. And, taking into consideration not only the Australian *continent*, but adding the Austro-Malayan sub-region, the Moluccas, and New Guinea, one may well accord to it the very first rank. Wallace tells us that, classifying

the Papuan birds according to their exterior, exactly one half of them deserve the title of "beautiful." Of all the birds collected in Malacca and near the river Amazon he accords this remark only to the third part, although both of these regions are considered conspicuous for the beauty of their birds.

The Australian continent is indeed inferior in this respect even to the neighbouring New Guinea, much though the faunas of these countries resemble each other. New Guinea alone has the advantage of harbouring the "birds of paradise," which group only has scanty representatives of the genus *Ptilhoris* on the Australian continent. *Ptilhoris*, however, is by itself quite rich enough in splendidly-coloured species, which form a much livelier and more striking ornament in the light and pale-coloured bush landscapes than in the rich and shady Papuan forests. How often, when wandering amidst the latter, did I hear the screams of the birds of paradise, the screeching conversation of the parrots, and the cries of cockatoos, without being able at once to discover the birds themselves, which are nearly invisible, in spite of their vivid colouring, in the darkness produced by the dense foliage of the gigantic trees. Only by and by did my eyes get used to finding them out. This is very different in Australia proper. When a flock of pencil-tongued Blue-mountain parrots (*Trichoglossus chlorolepidotus*), the plumage and beak of which shine in a wonderful mixture of green, yellow, scarlet, and purple, have settled down upon a blossoming eucalyptus, and have begun with graceful vivacity and with a tremendous noise to fly and climb about its transparent foliage, licking the honey with their pencil-like tongues, then, and only then, do you begin to have an impression of the radiant beauty of these creatures, which appear wellnigh insignificant when seen in a close cage, or stuffed in the glass case of a museum. The whole landscape seems enlivened and embellished by their presence. One day I with one shot killed three, and winged two of them. The latter I kept for some time in a small cage, which I had made up out of an old box. The wounds soon healed, but the birds always remained shy and timid, and only gave me pleasure when they allured flocks of their own kind with their enticing call, inducing them to settle on the eucalyptus trees round our camp for a "chat" with their imprisoned friends.

Just as remarkable and handsome is a kind of Rosella frequent on the Burnett, *Platycercus palliceps*, the plumage of which combines all shades from light yellow to dark yellow and orange, from light blue to ultramarine and dark blue, and to dark brown and black. Still more brilliant and many-coloured is the nearly related *Psephotus*

pulcherrimus, one of the finest parrots existing, but less conspicuous than *Trichoglossus*, because, like *Rosella*, it frequents rather the ground than the trees, and lives in small assemblages and not in large flocks.

In my opinion, however, the place for beauty should not be given to these many-coloured and gaudy birds, but to a parrot, the plumage of which shows but three colours; the head, neck, breast, and abdomen, in fact its entire lower part, are of a brilliant scarlet, its back and wings of a dark green, its long tail black. The colours of the female bird are paler and more insignificant.

The fact that the feathers of the male show no vivid hue beside that splendid scarlet, lends to this colour a brilliancy unlike anything else of the sort of which I know. In general I found that great variety in colour has less effect on our eye than a few strongly contrasting hues which occupy a broader space. Our bird, *Aprosmictus scapulatus* (very appropriately called "King Parrot" by the colonists), lives in the dense and sombre scrub, the acacias and casuarinae of which are low, and, though standing close to each other, do not form an impenetrable roof like the gigantic trees of the tropical virgin forests. Consequently the head, neck, and breast of the king parrot can be seen gleaming from afar amid the sombre green, which sets it off most effectively whenever the bird, scared from one tree, floats to another no higher than the first, gracefully and slowly flapping its beautiful wings. No gem can shine more brightly than this splendid creature shines amidst the monotony of its native woods. Once shot and lying dead upon the ground, the splendour of its colouring appears to have faded, and one feels quite a brute to have destroyed such a glorious work of creation.

Sometimes there appeared near my camp a flock of the well-known snow-white cockatoos with their yellow crests, *Cacatua galerita*. Then life and noise began to reign over the silent spot, and we could the better watch the merry clever birds, as they do not mind your approaching the trees on which they have settled. They are much more careful at Coonambula, where they pay unwelcome visits to the fruit, particularly to the water-melons, and where they are pursued and shot on account of the mischief they do. In spite of this they keep returning, taking good care not to be caught, and starting away with piercing cries as soon as anybody tries to steal up to them. As soon as the pursuer is gone, there they are again. Several kinds of black cockatoos (*Calyptorhynchus*) are much more

shy and difficult to observe. They are less sociable than their light-coloured relations, and I only saw them soar above the bush in small parties of twos and threes. Their voice is not so piercing as that of the white cockatoo, but rather hoarse and growling.

As already mentioned, the genuine finches, or Fringillidae, are quite wanting in the Australian region. They are replaced by the less musical though far brighter-coloured Australian finches, among which we find creatures of excessive grace, daintiness, and delightful colouring. I had greater pleasure in watching these lively and confident little creatures and their doings in the high grass of the bush or the reeds of the rivers and ponds than in shooting them for the benefit of my collections. Besides, I took for granted that they had long since received the attention of collectors and were no novelty to science. I rather regretted having spared them later on, not being able to settle the names of the species I had observed as I had secured no specimens. My brief notes about their habits and colouring did not prove sufficient for accurate determination.

In the middle of December the weather began steadily to improve, the rains grew rarer and less violent, the rivers continued to fall slowly but steadfastly. Circumstances were, however, such that I was sure of being prevented for two or three further weeks from beginning my work in this district with any prospect of success. Then, however, it would be too late, and the spawning-time of *Ceratodus* would have passed. Perhaps, however, I should succeed in finding out a district where less rain had fallen, and which therefore would prove more auspicious for my purpose. We had watched the rising of the rivers, and had noticed that the Burnett, although the first to rise, had never attained the height nor the power and rapidity of the Boyne and Auburn. So it appeared probable that less rain had fallen around its sources than around those of the two other rivers. If this proved true, it would be worth our while to try our luck in that district. Mr. M'Cord, whose advice I sought, agreed with my plan, and proposed I should accompany him alone to those parts, and inspect them myself before moving there with bag and baggage. He owned in that district a large run called Cania, which he entrusted to the superintendence of a manager, but which he used to visit and inspect every four or six weeks. One of these visits was due at the time, and I was to accompany him and to inform myself as to the condition of the rivers with regard to my researches. The trip would take me about a week. In the meantime Dahlke was to take such of my collections

as were ready and packed, to Gayndah by our dray, as soon as the rivers would allow him to do so.

On riding back to my camp from Coonambula I had a pretty bad accident. I had told Mr. M'Cord that none of our horses were good swimmers, and he had been so kind as to lend me one of his, named Edgar, which was considered to be a famous swimmer, and indeed proved such in my service. In crossing a swollen river it is often far more difficult to climb the bank in getting out than to cross the rapid current in the middle. I was well acquainted with the state of the banks in the neighbourhood of my camp, and used to get in and out in certain spots best adapted for this purpose. The condition of the banks was, however, liable to certain change just then, owing to the alluvial or destructive action of the water.

On my return from Coonambula that day, as I was briskly crossing the Auburn on Edgar's back, and steering slantingly towards a certain point lower down the river, which I knew as a good landing-place, Fred Horn, who was occupied with fishing somewhat higher up, called out something to me. Half deafened as I was by the rush and roar of the river I understood him to say, "You can come up here," while in fact he called out, "You *can't* come up here!" This advice was most uncalled-for, as I had no intention whatever of landing in the place where he stood, but was making up to the right spot of my own accord. There are, however, people who cannot resist giving their opinion and advice, whenever they see others execute a feat which they themselves would most probably never think of undertaking. Misguided by his unnecessary shouting, which reached me disguised by the sounds of the rushing river, I gave my horse a turn towards the direction in which Horn stood. Good Edgar followed his rider as readily and obediently as if he had been walking the ground, and would have carried me safely and surely along miles of rushing waters. On touching the shore he tried to set foot on the bank, but slipped back, so that I had to seek another place. Steep as this was, my horse succeeded in climbing it and in reaching the dry ground with its forefeet. But not only was the bank excessively precipitous, but likewise very slippery, so that he suddenly lost ground and fell with me into the water back undermost.

My men, who had been watching this event from the shore, told me that it was a nasty sight to witness. The horse falling with its back undermost, its legs stretched upwards, had seemed to crush me under itself in the water. In my own head thoughts followed each other with the rapidity of lightning. I well re-

member how I reflected, "What, now, if my horse should turn?" Immediately afterwards I was sensible of being knocked about in the water, and twice plainly felt the horse's feet upon my chest. I did not, however, feel this as pain, but just as a touch. All this happened under the water, which was so deep in this place that neither I nor the horse touched the ground. A moment later I was free and able to reach the surface. My horse had turned round and tried to climb the bank some steps farther on, but once more slipped back, luckily not falling upon me this time. At last it made a third effort lower down, and finally succeeded in reaching firm ground. As to myself, I felt neither pain nor was I stunned. Thus, having remained master of my strength, I without any trouble managed to swim to the shore and to climb out. My men came running up to help me, and together we examined my chest, and found the spots where the horse had kicked me but slightly reddened. At the same time I was able to ascertain that none of my ribs were broken, which was owing to the lucky circumstance that the blow had reached me while both horse and I were carried by the water, our weight being thereby diminished. The affair did not pass off, however, quite so harmlessly as at first appeared. On the two following days the pain in my chest was so violent that I was hardly able to move, and it took four weeks before all traces of sensitiveness had disappeared.

CHAPTER VII

MY EXCURSION TO THE UPPER BURNETT

IN rather a lamentable state of health I started on my trip to Cania and to the Burnett sources on the 15th of December. On the first day I did not proceed farther than Coonambula. There Hermann Wein was to join us the next day, and to help Mr. M'Cord and myself on our journey by taking care of the horses. Meanwhile Dahlke undertook the task of surveying the roads to Gayndah. Luckily none of the bigger rivers had to be crossed on the way to that place, for this would have made every attempt to get there with the heavy dray impossible. Fred Horn was to remain in the camp and to take care of our goods and chattels.

On the 16th of December Hermann Wein joined us at Coonambulá, telling me that Dahlke was going to start for Gayndah that afternoon. On the following day Mr. M'Cord and I set out for Cania in the buggy. We took five horses, two or three at a time being put to the buggy, whilst Hermann took charge of the unoccupied ones, driving them on behind us. Having started from Coonambula early in the morning, we reached the little mining town of Eidsvold two hours later. Here Mr. M'Cord had to preside at a meeting of the Divisional Board. The Board has to consult and to decide upon questions regarding the general affairs of the district, such, for instance, as the constructing of roads and other improvements for traffic.

I took advantage of this opportunity to get acquainted with this specimen of a newly rising Australian settlement. Having been to Eidsvold several times subsequently, I will here concentrate the observations I made on these various occasions. I saw mining establishments of a yet more primitive kind in the neighbourhood of Cooktown later on, where not only gold-diggers but also gold-searchers or prospectors initiated me into all the mysteries of their calling. Every prospector turns into a miner as soon as

he has found gold ; not every miner, however, has before been prospector.

Ever since gold, and subsequently silver, was first discovered in Australia, hundreds, or perhaps even thousands, of people at a time have been searching all over the continent for metal. These prospectors are generally hardy men, well versed in bush life, who must possess a considerable amount of personal courage and steadiness. Sometimes a prospector will set out by himself. Mostly, however, he will prefer taking a mate with him, for solitary travelling through wild and uninhabited country is apt to become very difficult, and even dangerous if, as is often the case, it has to be continued for months at a time. I think little of the danger to which one is liable in meeting with natives, though the latter must not be disregarded, they having made a victim of many a prospector. That which constitutes the principal danger to the solitary traveller is the risk of his eventually falling ill. The smallest mishap will suffice to render him helpless, whereas the presence of a mate will be of infinite value in such a dilemma. Of course he has to share with his mate, if good luck turns up and shows him the sought-for mineral. Let us suppose that he has found a promising spot : should he find alluvial gold in the sand of a former water-course, or a plentiful admixture of gold grain with a quartzose rock—what has he to do ? The first thing incumbent upon him is to look up the residence of the next police magistrate. This may be five or six hundred miles from the place of his discovery. To procure the right for further investigation, the happy finder has minutely to describe this place to the official, whereon he receives a claim around the spot which originally attracted his attention. This is termed a "prospector's claim." In his neighbourhood, and to his right and left, any other people who call themselves gold-diggers and are able to show a certificate of the Government, a so-called "miner's right," are allowed to procure smaller "claims." These latter are distributed according to the order of time in which the claimants make their appeal. Four men have to share in one claim, upon the condition of their really working the ground they have procured or having it worked by a substitute. If the claim be not properly worked the Government declares it abandoned and gives it to the next claimant. Should the place in which the gold was found prove extensive, and the amount of metal considerable, claims will be pegged out for miles and miles around the original spot. In other cases a small gold-mine will sometimes be worked by quite a small number of miners. As things are managed nowadays, claims

proving particularly rich are bought at high prices from their original owners by companies, who work them by help of a large number of labourers. So far as I am able to form an opinion, there reigns throughout Australia a most unlucky and unhealthy tendency to speculation with regard to these matters. Almost wherever you travel, conversation turns to mines, to floating mining companies, to mining shares. Not only do the inhabitants of the big towns indulge in this game of hazard, but the squatters, stockmen, and farmers speculate in that direction, particularly within districts which harbour a gold or silver mine. A considerable amount of precious metal is yearly produced and placed upon the market; and still it seems as if everybody who indulges in mining business were to lose money instead of earning it. This, at least, is a complaint I continually heard, whereas I have never hit upon anybody who owns to having gained anything. No doubt, however, such people do exist, probably among the sharpest and more knowing speculators, or else among the simpler gold-diggers who work their own claim in parties of four or eight, but apparently not amongst the amateur speculators, or amongst the companies with artificially inflated shares who have their mines worked by paid labourers.

The working of a mine is very different, according as the gold is found in an alluvial state or embedded in quartzose rock. In the first case, the washing of the auriferous sand is all the work to be done. I have never seen gold-washing myself, but I have seen tin-washings in the neighbourhood of Cooktown, to which I must refer later on.

In Eidsvold the gold is found in quartz reefs. The quartz therefore has to be crushed before it yields the gold-grain embedded within it. No profitable alluvial gold has yet been discovered. A few shafts have been put down on trial, but nothing workable was obtained.

The region in which the gold is found lies between the Burnett and Boundary Creek. Irregular, frequently broken ridges of granite cross this part of the country. Their surface is covered with blocks of granite of a rounded shape, owing to the rock's weathering in concentric layers. The granite is of a brownish colour with a light reddish tinge, and, for the most part, medium grained. Here and there it turns into finely-grained syenitic granite, and in places where both these minerals are interlaced the rock has a piebald appearance. Towards the east these primary rocks pass into layers of sandstone, which owe their origin to the decomposition of the

granite. Fossil remains do not appear to exist within these layers. Still farther eastward follow layers of fine-grained sandstone, quartzites, and slates, which, on lithological study, have probably to be referred to the Devonian, covering a large area of the Burnett district.

The reefs in which the gold is found lie within the granite. They run through the primary rock in various directions, mostly N. by W. or N.W. by N. The first discovery of gold was made by a stockman called Achilles in 1886, and since that time a settlement of nearly 2000 inhabitants has arisen, possessing a court-house, a church, a hospital, a school, two banks, numerous hotels and inns, shops and warehouses.

While Mr. M'Cord had his meeting, the police magistrate, Mr. A. R. MacDonald, was kind enough to take me about and show me the sights of the town, which may be described as interesting but by no means beautiful. Interesting only as illustrative of the energy and common spirit which have succeeded in creating out here, far from the trodden paths of the civilised world, that which we call culture. Thus law, religion, and education, finance, traffic, and commerce, have found homes erected for them in this out-of-the-way place. It must be owned that these "homes" can hardly lay any claim to beauty, being entirely devoid of architectural merit, I might almost say of shape—wooden houses, just sufficing for the barest needs and covered with galvanised iron, insufferably dazzling to the eyes of the spectator in the glaring tropical sun.

He who builds a house out here only thinks of present need and comfort, for does he know how long the mining will prove remunerative in this spot? A few short years and it is possible that the winds may scatter these miners to the four quarters of the globe, after their having duly turned to advantage the treasure offered to them by this primæval soil. Then nobody will remain but perchance some of the farmers, who have begun to till the ground near the river. The buildings will fall to pieces and disappear, the machines for crushing the quartz will be removed, and only the burial-place will bear testimony to the existence of the once active little town. For the wooden houses do not even leave any trace in the shape of ruins.

In the afternoon I with Mr. M'Cord entered the shaft of the mines "Mount Rose" and "Stockman's Junction," down to a depth of about 200 feet. The auriferous quartz-reefs are very extensive and several feet in diameter. The gold contained in them is, however, so minutely interwoven as not to be visible to the naked eye.

Beside it there also exist pyrites. The working of the mine is very simple. The quartz is removed from the soil by boring into the rock, blasting it by dynamite and fetching up the fragments. Should the reef run down into lower depths, one follows it as far as possible. After being brought up the pieces of rock are pounded into yet smaller fragments by so-called "batteries," cylindrical stamping-irons standing upright in rows. Moved by steam, they grind the stone till it becomes a fine grain. In order to separate the gold-dust from the quartzose parts, this grain is driven along by water over an extensive stretch of slightly sloping ground. The heavier gold-grain sinks to the bottom and there remains, while the lighter quartz sand is washed away by the water. For the purpose of saving even the minutest gold-dust, little channels filled with mercury are dug at regular intervals across the path the water has to take. The mercury and the gold-dust running over it form an amalgam, which is, however, easily separated into its constituents by the influence of heat.

In these mines one ton of rock yields, as I was told, upon an average one ounce of gold. During the previous month Mount Rose and Stockman's Junction had produced 800 ounces of gold, which represent the sum of £3200, one ounce being worth £4. Of course one has to deduct considerable working expenses for wages, machinery, and the interests of the business capital, but nevertheless the working of a mine proves remunerative as long as the ton really yields one ounce. It is, of course, different if the reefs, the farther you pursue them, become barren or entirely destitute of gold. Mines which produce two, or even three ounces of gold a ton, like the celebrated Mount Morgan Mine near Rockhampton, yield a splendid profit, and the Australian speaks of them with deepest reverence.

After having visited the mine and returned to our abode, "Sarrie's Hotel," I was deigned worthy an honour up to that day unknown by me: I was interviewed. Eidsvold is already so far advanced in culture as to possess its own paper, *The Reporter and Eidsvold Miner*. Everybody will understand that its editor has not much difficulty in encompassing the material offered him; that his difficulty, on the contrary, consists in filling his columns. Thus an interview furnishes a splendid stop-gap, and a Professor who has travelled all the way from Germany to Australia on purpose to see Eidsvold is likely to be presented to the miners as an astonishingly great man and deeply learned personage.

I gave the editor all the enlightenment he wished for, but have

neglected to peruse what he told his faithful readers next day as to my interesting and elevated views about Eidsvold, Australia, Europe, and about the economical and political situation of the world in general. He, moreover, tried to entice me to write some articles myself as to the aim of my journey, my success up to that day, and my impressions of Queensland generally, and the district in particular. I, however, succeeded in overcoming his desire.

At four in the afternoon we left Eidsvold, and after a two hours' drive we reached Dalgangal, the owner of which, Mr. W. Kent, was absent. The next morning we continued our journey. This day proved excessively hot, and the endurance of our grass-fed horses, which drew us from 7 A.M. till 4 P.M. up hill and down dale, over hedge and ditch, mostly in a trot and taking only little rest, was truly admirable. During our tour, Mr. M'Cord gave me a lesson in four-in-hand driving, and I made some little progress in this art, though I am convinced that, left to my own resources, I would never have succeeded in steering the vehicle safely to Cania. Our team, however, only consisted of three horses, but as to the manner of driving that amounted to the same thing. At noon we partook of a simple meal at Milgildi, an out-station of Dalgangal.

Now we approached the surroundings of Cania, which is a rather mountainous region, and is crossed by an affluent of the Burnett, the Three-Moon Creek. The soil is richer there than on the Middle Burnett, the rains more frequent. Consequently the pastures are of a better quality, and the place is used by Mr. M'Cord as a "fattening station." That means that the cattle destined for sale are fattened in certain paddocks within the station and then taken to the coast.

Cania is surrounded by a series of small and big swamps, sedgy lakes, and lagoons. All these are haunted by a great number of waterfowl, which, having hardly any persecution to endure, are not in the least shy, and let the sportsman come up quite close to them. Mr. M'Cord well knew all the haunts of the wild geese and ducks. So from time to time we stopped our buggy, one of us remaining on it and holding the horses, whilst the others cautiously stole up to the game. As a principal resort of the fowl, Mr. M'Cord had mentioned a big lagoon about an hour and a half from Cania. There we intended to wage battle on the winged foe, after having laid a proper plan of action. About half a mile from the lagoon we stopped, got off the buggy, unharnessed our horses and tied them to trees. Hermann Wein was now told to ride round the lagoon in a big curve and to drive the game towards us. We meanwhile took up our

respective positions, each on an opposite side of the longish lake, well sheltered by some trees from the sight of the shy waterfowl. After a while loud shouts were heard in the distance. They arose from our beater, Hermann, and drove up the thousands of birds which peopled the lagoon, so that the air was literally filled with them. There were also a number of swans amongst them, the black Australian swan, which we frequently see at our Zoological Gardens and European parks. In spite of the quantity of the scared-up game we shot but few, ducks as well as geese flying too high above our heads. We spent a lot of shot, but saw only a few birds fall into the water. Probably even these were only wounded in the wing, or else very lightly hurt; for on beginning to look for the fallen ones, we did not find a single bird. The wild duck is, as was already mentioned, a very shy creature. When wounded, it creeps into the densest sedges, or hides its body below the water, riveting its feet into the mire at the bottom, and only stretching out its beak for breathing. Sometimes it even swims to the shore, and runs away while you look for it amongst the reeds or on the water.

We consoled ourselves as to this defeat, having killed a fair number of game during the preceding hours.

On returning to our horses, we had a disagreeable surprise. Three of them, which we had fastened to trees, had torn themselves away, startled by our continued shooting, and had thereby damaged the harness, which we had left on them. We were obliged to mend it as well as we could, but had great trouble next day to repair it sufficiently for our long journey back. The two reserve horses that Hermann had taken along with him besides, had chosen to bolt as soon as ever the cannonade began. It was impossible to find any trace of them, and not until two days later were they found and caught by Cania men. Thus it happened that only late after sunset we reached Cania, richer by five ducks, poorer by two horses. There Mr. Dixon, manager of the station and representative of Mr. M'Cord, and Mrs. Dixon, welcomed us most kindly.

I now immediately began my investigation as to the state of the rivers and the possibility of finding any *Ceratodus* spawn. As we had expected, far less rain had fallen up here in the north around the Burnett sources, than about its middle course and near its affluents the Boyne and the Auburn. Already in Dalgangal, where we had bathed in the river the evening before, we hardly found it swollen, and heard that there had been no flood to speak of in those parts. The same was the case with Three Moon Creek. This agreeable news was, however, simultaneously cancelled by my being

nformed that my fish neither came up as far as Cania or the Three Moon Creek, nor existed in the upper course of Burnett itself. Considering this, it would have been utterly vain to remove my camp to these regions.

In Cania there was a grand mustering going on at that time, and the yards were filled to overflowing with cattle. During the first night we spent there a little accident happened. The weaners had been put into a yard by themselves, to be branded next morning and then taken to a place where their mothers would not be able to find them and so offer them milk. These animals, exuberant with youth and strength, and excited besides by the absence of their mothers, had broken the fences and escaped far enough to make their recovery very difficult, the more so as they had dispersed in little groups. By chance Mr. M'Cord, Mrs. Dixon and I closed upon a big troop of the runaways when out riding the next evening, and were able to drive them back to the station.

Mr. M'Cord had principally come here to pick out a thousand fat cattle for the Sydney market. Thus I got acquainted with one of the most interesting parts of stockwork, namely the "camp drafting," that is to say, the separating of certain head of cattle out of a big herd. For this purpose the herd is driven to a convenient place, where a number of horsemen keep riding round it as long as the work lasts, to prevent it from moving away or scattering.¹ We generally collected herds of 500 to 800 head, whereupon Mr. M'Cord picked out those specimens which he thought adapted for sale and which had to be separated from the rest. The latter feat is accomplished by a rider who has to fetch the chosen animal out of the herd with the help of his good and well-broken-in horse. This is not so easy when the herd is extensive, as the pursued animal will always try to break back and mix once more with its fellows. Besides, one must be careful not to drive any wrong individuals away from the main body. The stock horses are incomparable at this sort of work. They know exactly what has to be done, and keep to the point body and soul. They notice every movement of the cattle in question, cut off its way, supposing it is trying to escape, and show true common sense in the matter. All the while they behave so independently, taking such sudden turns whenever the animal they are pursuing changes its direction, that a bad or inattentive horseman will easily be thrown off. The separated animals are likewise guarded by a number of horsemen who ride around them to prevent their mixing once

¹ This manoeuvre is called "rounding up" by the Australians.

more with the rest. As long as there are few of them they have to be watched most carefully, since they are intolerant of isolation, but as their numbers increase, they begin to regard themselves as an independent little herd and once again graze quite comfortably.

During the following days I rambled all over Cania with Mr. M'Cord and some of the stockmen. I saw an amount of camp drafting, and was able to shoot ducks and geese to my heart's content. These rides were sometimes fairly tiring—thus on 20th December, a very hot day, I was on horseback, with hardly any interruption, from 6 A.M. to 6 P.M.

The day before we had used the afternoon for a very interesting excursion to the so-called "Gorge." The way there leads through wide and rich pasture-land, surrounded by gentle hills. All around our way were swamps and lagoons, densely grown with sedges and reeds, and inhabited by innumerable water-birds. The Gorge itself is cut into the rocks by the Three Moon Creek, which flows through it. The walls of rock on both sides of the river form an almost vertical precipice; the stone is excessively weather-beaten, and divided by many chasms and caves, so that in some places it reminded me of the walls and bastions of a fortress. It is, in fact, called "Castle Mountain" by the settlers. The height of the rocks rises to at least 300 feet. Their material consists of the celebrated Australian desert-sandstone belonging to the cretaceous age. Doubtless the surroundings showed the same height in former periods as the walls of the Gorge do to this day. They have dwindled in the course of time through denudation, and only the two walls of sandstone which form the sides of the Gorge at present, and which diverge in the direction of the Cania gold-field, have held their own. A still more celebrated example of denudation is furnished by the famous Chambers Column in Central Australia, a column of about 150 feet, standing in the midst of a level range of sandstone, and surrounded by other mighty sandstone rocks, which resemble ruined castles and fortresses.

On the right bank of the Creek, behind the Gorge, lies a dense scrub crossed by numerous water-courses. This scrub interested me specially, its vegetation being completely different from that presented by other scrubs on the Burnett. It bears a strong resemblance to a tropical virgin forest, the like of which Queensland only offers in the vicinity of her coasts. Instead of the acacias, eucalyptus trees, tea-trees, and casuarinas, which are so characteristic of the Australian scrub, we are astonished to find palms and tree-ferns, true

children of the primæval forest. Lianes wind themselves from one tree to another. Amongst the branches, orchids and mighty epiphytic ferns luxuriate, amongst others the "crow-nest fern" (*Asplenium nidus*) and the "stag-horn fern" (*Platycerium alcidorne*), the wonderfully formed leaves of which seem to imitate the shape of elk-horns. I seemed to be transplanted into another world. Seeking an explanation of so sudden a change in the vegetation, so totally different from that of all the surrounding parts, even where the soil retains the water and is of a swampy character, I came to the following conclusion. Most of the plants characteristic of the tropical forest not only demand a sufficient supply of water by their roots, but a vaporous atmosphere for their upper leafy parts, and they will never thrive in an atmosphere devoid of humidity. This may be said of all the tree-ferns and of most, but not of all palms. The well-known date-tree, for instance, is a child of the desert, and would be able to exist in a typical Australian scrub. According to an Arab saying, it likes to bathe its feet in water, whilst its head is scorched by the sun. Most other palms, however, will not thrive unless surrounded by a certain amount of humidity in the air as well as in the ground. Now the Cania region is more exposed to rains on account of its higher mountains than most other parts distant from the coast. Quite particular conditions seem, moreover, created by the steep walls of the "Gorge," which operate like a sort of trap in which the damp east winds get caught, whereupon they expend their moisture, condensed into rains and fogs, on the little virgin forest. The existence of the latter denotes, besides, that germs and seeds of yonder plants are continually wafted from the coast to the interior, and thus we see that the scarceness of tropical plants in the interior is owing solely to the aridity of the air, and by no means to the absence of germs.

Nor was the fauna of this Cania scrub, which, however, I have not closely studied, identical with that of the common brigalow scrub near the Burnett, since on coming home from our ride several of us had blood on our clothes, and on undressing we found a number of leeches, which had crawled up our bodies during our rambles through the wood. Within the common Australian scrub I had never found any leeches. They are, however, a perfect curse in the forests of the East Indian islands, and abound likewise in the woods of the Australian coasts, and they were the plague of my existence during my stay in the tropical forests of Cooktown.

On the 22nd of December, early in the morning, we left Cania, the excursion having proved interesting to me in various ways, in

spite of my disappointment at not having found it favourable for my special researches. In the evening we arrived at Dalgangal, where Mr. W. Kent and his brother were at this time present. At noon on the 23rd we reached Eidsvold, and during our stay in the little town I bought some Christmas presents. It is wonderful what a variety of pretty things may be had in such a little mining-town, a testimony to the practical common sense of the inhabitants, and to their faculty of making themselves comfortable wherever they settle down for ever so short a time.

In the evening we arrived at Coonambula once more, and early next morning I returned to my camp. Here I found everything in ship-shape order. Dahlke had returned from Gayndah safe and sound. He had brought with him his nephew, Albert Dahlke, a strong, clever, and intelligent lad of sixteen; in spite of his youth, an excellent horseman, and one who knew how to handle a gun. I willingly took him into my service, as I intended to give warning to Horn, with whom I did not get on. To my joy I noticed that the rivers had considerably fallen, so that I was able to begin work once more. In the afternoon I rode back to Coonambula, there to spend Christmas. It was to-day the 24th of December. I had donned the best suit I had with me in my camp, and had fastened the little presents I had bought for the children to my saddle in front of me, beside two scrub-turkeys, which my people had shot. It was now possible to cross the river without swimming, provided one drew up one's legs to keep them from getting wet. In the middle of the river, still alive with timber and trees torn away by the late flood, my horse began violently to kick. Probably it had been hit by some branch or root below the water. All at once I felt myself jerked into the water, head over heels, but, as I at once perceived, still sticking on to the saddle, so that I thought the beast had turned a somersault, and expected to feel its hoofs on my chest as once before. Luckily this was not the case. The horse had simply burst the old saddle-strap by its violent kicking, and had thrown me and my saddle over its head into the river. I first tried to save the saddle and the articles attached to it, then I had the pleasure of changing my clothes, thus arriving at Coonambula only late in the evening.

Here I spent a good time in the company of my friends. Next day we all had a grand Christmas dinner, with turkey and plum-pudding. On my returning to my men on the following day, Mrs. M'Cord made me take back a big piece of the pudding for them, which aroused great enthusiasm. Indeed, far from my dear

German soil as I was, I could not possibly have found another hearth to welcome me so warmly and make me feel so much at home as that of Coonambula.

The following time was spent in steady endeavours to search the water for *Ceratodus* spawn. Jimmy and his family returned to me, offering to enter my service once more. I did not accept their offer, but held out £5 to them as a reward if they could show me a place containing *Ceratodus* eggs. The days meanwhile grew hotter and hotter, the rivers kept falling, and began to abound in weeds. But all our endeavours were in vain, far and wide as we extended our researches, camping now here, now there, and searching in the water for hours together. I could not but believe that the spawning-time of the fish was over, and that I had missed the right moment. Still I did not give up hope.

On New Year's Eve I was at Coonambula once more, and on New Year's Day we went to Eidsvold, where races take place annually at that season. Horse races are the national sport of the Australian, and occupy the general interest still more out there than they do in the "old country." This is no wonder in a colony in which the breeding of horses plays such an important part. The beasts themselves are so cheap, and their keep so easy, that even in big towns the labourers may be seen going to their work on horseback. Everybody out there knows everything about horses, is interested in the celebrities of the day, and seeks their personal acquaintance. Thus the Eidsvold races are just such a grand day for the inhabitants of the Middle Burnett, as the great races of Melbourne and Sydney are for the citizens of those towns.

One may describe Australia, in general, as the country of sport. Almost every settlement near the coast has its cricket and football team, and these often make great journeys along the coast on purpose to measure their powers in a tournament. But the principal sport of the Australian is horse-racing. The Eidsvold races were nothing very remarkable, the horses not being of a particularly brilliant order, save some stallions belonging to neighbouring squatters. Whereas the course was well chosen and carefully levelled, the convenience of the public seemed of minor importance, no kind of seats being arranged for the lookers-on. We watched the races from our buggy, and had much to suffer from the heat, the first of January being for the southern hemisphere as the first of July for our own, and Eidsvold, moreover, lying quite near the tropic on about the same latitude as Calcutta. The thing which interested me most was the intimate knowledge of horses which all the onlookers,

down to the children of five, seemed to possess, and the detailed comments they made upon both horses and riders.

The following weeks were very industrious ones for me. Our work was rendered yet more difficult by the suffocating heat and by the present height of the grass, which very much impeded our movements whenever we had to go on foot. I made another excursion to Cadarga Creek, an affluent of the Auburn, said to harbour many *Ceratodus*. This creek rises from a rough and pathless mountain region, almost impassable by our horses. We had continually to cross the creek, and to climb up and down steep and rocky ascents. Here and there we had splendid views of the wild and rugged mountain landscape around us. We persevered as far as we could by making our own paths. Ways there were none, and, unluckily, we had not taken any black guide with us. This expedition served, however, to give me the last proof that the spawning-time of *Ceratodus* had gone by. This was also Jimmy's opinion, who had examined the whole Boyne upwards of our camp, and returned to me about the middle of January, telling me that all further search would be in vain, he having already discovered a little "djelleh" of $1\frac{1}{2}$ inch between the branches of a water-plant which he had lifted out of the stream. Thus I could not close my eyes to the sorrowful fact that I had not entirely realised, although not completely missed, one of the principal aims of my journey. In the beginning of November I had, indeed, procured myself some early stages of the fish's development. But it had been a small number, a not uninterrupted series, and by no means sufficient to furnish data for the entire genesis of this interesting creature. This was the more depressing, as I had centred my principal endeavours on this very point. There was nothing left now but to accept the fact, which was neither to be denied nor altered. To stay here any longer would have meant utter loss of time, as the coming months till June would have not even furnished me with any material in the development of marsupials or oviparous mammals. So I unwillingly made up my mind to leave this place, contenting myself with the success I had achieved, far though it fell short of my expectations. The next week I spent in packing the rest of my collections, in brazing them into tin cases, or in stowing them away into a big cask filled with spirits of wine. In two cart-loads my baggage went to Gayndah, where I sold part of my camping outfit, leaving the bigger portion to Dahlke as a present and reward for his faithful services.

On 22nd January I definitely broke up my camp, sending Dahlke and the other men to Gayndah, whilst I myself repaired to Coon-

ambula to remain some days longer with the M'Cords. My return to the coast was not so urgent, as the heavy carts, which took my collections down there, would want a far longer time for the journey than myself.

On the 26th of January I at last took leave of my new friends at Coonambula, a sad day for all of us, as it seemed hardly probable that we should ever meet again. On the 28th I reached the coast at Maryborough, where my collections arrived next day and were shipped by me to Europe. On the 30th of January I went by train to Brisbane. There I arrived, after my five months' stay in the bush, in excellent health, but by no means excellent spirits, my scientific achievements having, alas, remained very far behind my expectations.

CHAPTER VIII

MY RETURN TO THE BURNETT

My plan had been to spend a year and a half on my journey, and I had taken leave of absence accordingly. More than the third part of this period had already elapsed, and I now proposed to employ some time in the study of marine zoology on Thursday Island in Torres Straits. I planned to go thence to Java, and then to make a prolonged stay among the Moluccas or in one of the great Sunda Islands.

In Brisbane I stayed for about a week, and enjoyed the hospitality of the Governor of Queensland, Sir Henry Norman (who has since been created Viceroy of India, but has declined the appointment); the Under-Colonial Secretary, Mr. W. E. Parry Okeden, brother-in-law to Mr. M'Cord; the German Consul, the Honourable Johann Christian Heussler; the German Physician, Eugene Hirschfeld, and many others. On the 9th of February I started on my journey northwards on board the *Peregrine*. The weather was fine and clear, the sea calm, and I greatly enjoyed the passing view of mountains, reefs, islands, primeval forests and settlements, which this north-eastern coast of Australia offered to my sight. This is, however, not the place for describing the above passage, which I again made twice later on. On 11th February we arrived at Townsville, where we had to leave our good ship and go on board the less-agreeable *Victoria*. On the 18th of February we cast anchor off Thursday Island, where I stopped for six weeks, shooting fishing, and collecting. All this time the weather was so bad and stormy that I was sometimes forced to sit idle for days together. At such times I was beset by black thoughts. It weighed upon my mind that I had not, or at least had so insufficiently, fulfilled my plans as to *Ceratodus*. This, it is true, was not my fault, but I felt that the insufficiency of my success would depress me for years to come. At the same time, I was absolutely certain of succeeding better if I tried a second time. Had I not grown well acquainted

with bush life? Did I not know every watercourse and every scrub near the Middle Burnett? Had I not closely studied the life and habits of the animals, won friends and helpmates among the settlers, who would do everything in their power to further my aims, and had I not learned by bitter experience how to treat the blacks? Was I to take all these dearly-bought experiences with me as a dead capital to countries where they would be of no direct use to me, or should I venture another attempt? I was quite sure of my success next time, provided weather, rain, and floods were not against me once more. This, however, was the question. Was I to change all my plans, give up or shorten my stay in the tropics, fit out another costly expedition, stay on the Burnett for months again, only to be deprived of the prize of all these sacrifices by another flood? To leave the Burnett a second time without having attained my purpose would have been still more depressing and shameful than on the first. These thoughts kept following me by day and by night. I perfectly remember the spot, where, on a dreary and stormy Sunday afternoon towards the end of February, I suddenly made up my mind, saying to myself, I *must* have another trial, cost what it may. It would have been cowardly to desist from a second attempt for fear of fresh disappointments, and the chances of my new enterprise were decidedly rather favourable than otherwise. My resolution once being fixed, no more doubts assailed me. I immediately took all the measures the changes in my plans necessitated. I wrote home and asked for six months' extension of my leave of absence. I gave notice to Dahlke that I would come back in about four months, and secured his further services. Meanwhile he was to make all the necessary preparations, so that on my arriving at Gayndah we might immediately set out for the bush. Besides himself I proposed to take with me two white men, a couple of handy young Queenslanders, whom he was to choose and to engage on my behalf. The principal thing was, however, to secure myself the help of some blacks. If I returned to the Burnett in the beginning of July, I was sure of being able to complete my series of Echidna embryos, provided I had a number of reliable blacks with me. Our parting the year before had not been of an entirely amicable character, but by my return in July any ill feeling would be a thing of the past. The blacks would have had their fill of mere roaming; they would have learned what it is to do without sugar, tea, damper, and perhaps even tobacco, and would have become tamed by all this abstinence. I also relied on the influence Mr. M'Cord possessed over some of the blacks. Of course I immediately gave notice of

my altered plans to my friends at Coonambula, and had kind greetings and precious advice sent back by them.

I had four months yet before me, ere it would be of avail to return to the Burnett. I proposed to spend one month on Thursday Island, two in New Guinea, and to use the fourth leisurely in returning to the Burnett, stopping for a while at some place by the way in tropical North Australia.

I executed all these plans, and will duly recount my adventures in Thursday Island, the south-east of New Guinea, and North Australia. Meanwhile let it be said that on the 4th of July I was once more in Maryborough, on the 7th in Gayndah. Most kindly was I greeted by my old acquaintances and friends, most kindly by the sun, smiling upon me and upon the wide pasture-lands and the gigantic eucalyptus trees of the Australian bush. I must own that I had once more to get accustomed to this landscape ere I was able again truly to appreciate its peculiar and severe charms. Since last I viewed them I had seen the picturesque coasts of the islands in Torres Straits, surrounded by the glorious tropical seas, had admired the proud gigantic mountains of New Guinea, had wandered through the luxuriant Papuan forests, which have not their equal in the world as to animal life and brilliancy of colour. Thus it came about that the thinly-grown bush landscape at first appeared to my fastidious eyes somewhat dull, parched, and colourless, and I asked myself whether my former admiration of it had not been based on a sort of self-delusion. The impression which the landscape made in the then coolest and driest part of the year was, however, particularly unfavourable, the grass, which plays such a prominent part in the *facies* of this country, being now yellow, scanty, and parched. In time, however, my eyes got once more accustomed to recognise the beauties of these regions. Towards the end of August the grass grew as rich and thriving as before, the acacias of the scrub covered themselves with yellow, the tea-trees in the river-beds with red or fragrant white blossoms, and my old predilection for the scenery returned.

As we all know, tastes differ, and there is no absolute measure for beauty. In general we term that "beautiful" which pleases most of us. Still it is advisable not to bow too readily to the opinion of the majority. How many of us think that because a view or an object of art is of world-wide renown or recommended to us by our guide-book, we must not fail to do homage at its shrine, even if nothing within us is moved by the sight of it. Self-deception is very potent in such cases, and it is difficult for us all to avoid falling a prey

to it. Now the typical Australian landscape is by no means renowned for its beauty ; on the contrary, I often thought it underrated. I myself had perhaps committed the converse mistake of going too far in my mistrust of the general opinion, and had suggested to myself an impression of beautiful scenery where, in fact, only bare grass levels, dull-coloured trees, and waterless rivers were to be seen. Many a traveller coming from bold-shaped New Zealand, luxuriant Ceylon or Java, and who himself would throw but a passing glance on the quaint Australian landscape, will believe me to be insincere in this my praise, and declare my views a vain self-delusion or the idle tattlings of a would-be original author. I cannot prove my sincerity, and have not even support in the opinion of the majority. But I state once for all that, after having tested myself conscientiously, I cannot do otherwise than warmly admire this country's charms without laying down the law as to its absolute beauty.

Arrived at Gayndah I found that Dahlke had prepared everything with the utmost care and circumspection. I had given orders as to the arrangement of two separate camps : one near the river was to be the stationary starting-point for all the other operations, and was specially told off for the search for *Ceratodus* spawn ; the second was to follow the blacks in quest of further stages of *Echidna* and marsupial development. Dahlke made me acquainted with two young Queensland men of German extraction, who were inclined to enter my service, and whom he recommended as sober, reliable, and industrious—Andrew Wein, the brother of Hermann, who had been with me the year before, and who was now prevented from joining me, and Edmund Haupt, a good and experienced stockman and an able rider. I engaged both, and took with me besides Haupt's young brother, Balthasar, a lad of fourteen, who was to help in the camp and to watch it when we should be absent.

In Gayndah I found a number of blacks, who waited on me by the direction of Mr. M'Cord. Frank, too, was among them, quite easy of manner and apparently very much pleased to see me again. I, however, instantly informed him that I declined his valuable services, whereon he tried to revenge himself by enticing the other blacks away from me. This manœuvre partly succeeded, but only with respect to the less able and serviceable members of the train. Another party of blacks, and amongst them faithful Jimmy, I hoped to find near the Boyne and secure for my service. In a day and a half everything was arranged so much to my satisfaction that I was able to leave Gayndah. My white companions started for the

Boyne with the dray and numerous horses, and were to pitch a camp in the neighbourhood of Cooranga station. Our luggage and provisions being more plentiful than previously, we used a bigger and stronger dray drawn by six horses. The blacks went by themselves to the hilly region east of Cooranga, and promised instantly to begin to hunt *Echidna*. I myself rode straight to Coonambula, to greet my old friends and to consult with Mr. M'Cord as to my operations. We very much enjoyed meeting once more, having hardly expected to see each other again, and certainly not after so short a separation, hardly six months having elapsed since my departure. I remained at Coonambula for several days, choosing from among the station's breed a white horse of Arab blood named "Blue Beard," much better adapted for long rides than poor old Shamy. The latter was likewise still in my possession. I had left him with Dahlke, who had, however, not succeeded in selling him. Blue Beard was an excellent horse, well-built, fiery, enduring, and agreeable in his movements. He possessed but a single vice, that of suddenly shying in the middle of any pace whatsoever. He would then begin to rear, jump to the right or left, or else stand stock-still in the middle of a canter, and leap a yard high over some insignificant thing lying on the ground that had caught his eye—tricks which forced the rider to keep a sharp watch over him, a rather tiring thing on prolonged expeditions. I believe that some abnormality of his sight provoked this strange action. I later on exchanged this animal for another dark-brown, somewhat heavily-built, horse called Lynx, which answered all requirements.

On 14th July I repaired to my new camp on the Boyne, where I found that my men had arrived two days before and had got ready everything according to my wishes.

The situation of this camp had already been fixed by me from Thursday Island, when making arrangements for my second stay on the Burnett. On looking for *Ceratodus* spawn the year before, and on examining the water-courses far and wide as to the best stations for finding the fish and its eggs, I had been struck by a very broad and deep waterhole of the Boyne, which looked very promising. It was not much farther than a mile from Cooranga, though about twenty miles from Coonambula. It consisted of two parts separated by a narrow and flat portion of the river. This latter furnished a convenient place for crossing. The lower part of the waterhole was its more extensive part. It was more than a mile in length and a third of a mile in breadth, was several yards deep near the right bank even when the water was low, shallower near the left, and throughout

abounded with weeds. Both downwards and upwards there were several other waterholes, and these furnished us good game during the following time. The surroundings were abundant in wild and dense scrubs, and the highlands east of the right river-bank were said to be a favourite resort of *Echidna*.

Here, on the height of the left river-bank, I had determined to establish my camp, and in fact these were my headquarters during the whole of my second stay on the Burnett, which covered the period from the 14th of July till the 13th of October, just three months. Here we settled down quite comfortably, profiting by our experiences of the year before. We had a number of good and roomy tents, built ourselves a nice firm humpy, besides a big arbour, open at the sides and covered with bark, for work and meals, and lastly a well-appointed fireplace, sheltered against the rain. Some boards we had brought with us from Gayndah furnished us with quite convenient tables and benches. I directly began with the building of a dug-out, and there being no lack of experienced hands and good tools, we were able after three days to launch our little vessel of Kurrajong-wood. It was 4 yards long, $\frac{3}{4}$ of a yard broad, light and handy.

As I wanted very much to procure myself some good material of the development of marsupials, we made some traps and set them up all around our camp. We adopted two principal types: box-like traps made of yard long pieces of hollow trees closely nailed up at one end; at the other a trap door, which fell to and closed the entrance as soon as the animal touched the bait suspended inside. Some sharply roasted damper proved the best bait. The second set of traps were constructed as follows: a strong board charged with heavy logs or stones was kept standing in a slanting position upon the ground by means of a stand composed of three sticks which resembles the shape of the figure 4. The bait was fixed to the sticks, allowed to lean against each other quite loosely. As soon as an animal touched them in trying to get at the bait, down fell the board killing the thief. In this manner I have caught, or rather killed, many "'possums," sometimes also bandicoots and kangaroo-rats. Most of the "'possums," however, had already young ones in their pouches, and only very few yielded the intra-uterine stages so valuable to me.

Here I must mention a most peculiar idea spread broadcast among the "bushmen," and as firmly believed in by them as was in former times the movement of the sun around the earth. These people are of the firm opinion that the embryos of marsupials do not

Our Head Camp on the Boyne. July 1892.

develop within the uterus of the mother beast like the germs of other mammals, but that they grow from the teat, where they are also impregnated. They solemnly assured me that marsupials were "conceived on the teat."

This erroneous idea springs from the fact that the *intra-uterine* embryos of marsupials are so small, that a layman would not detect them on opening the animal. The young one is born in quite a feebly developed condition, as a semi-transparent, apparently shapeless object, is instantly hidden within the pouch, where it sucks itself so firmly to the teat that it can hardly be severed from it. Thus people think that here is the origin of the animal, and no arguing will get this conception out of their heads. On my showing my men the youngest stages within the uterus, they at last declared themselves convinced, and from that moment my fame as a grand naturalist grew great among them. They considered this a discovery of vital importance, which they communicated to everybody they met, and were henceforth proud of their Professor's unerring wisdom.

Every naturalist when travelling will make inquiries as to the existence and habits of the indigenous animals from the natives of the country, be they white or black, and will in this way collect valuable information by exercise of a necessary criticism. Credulity is just as wrong in such a case as absolute scepticism. Often the *facts* related by black or white hunters and fishermen are of value, and only the conclusions they draw are false. The observations themselves I only believe if related to me by the original observer, and not if they come to me by hearsay or even second or third hand. Observations made and related independently of each other by different people are mostly deserving belief. But the best method is entirely to depend on one's own eyes, the most wonderful fables being sometimes told you by different people, in apparently confirmatory terms, every one, moreover, illustrating them by personal experience. On the Burnett tales of fabulous creatures abound more than in any other part of Australia, the repeated visits of naturalists having acquainted the white settlers with the fact that amongst them exists a wonderful creature, my own *Ceratodus Forsteri*. Now where there is *one* prodigy of the sort, there, they believe, must be some others to keep it company. Thus I was told several stories about fabulous animals, to which I listened with amused attention. I always found the statements of the blacks correct, so long as they related to immediate observation. Their brains are not productive enough to invent anything new. Thus

in the place of religion they possess nothing but a certain dull superstition, which has engendered some confused notions about demons and spectres. They rarely go so far as to invest these creations of their brains with any definite shape, whereas the higher organised brain of the white man consciously or unconsciously invents more or less groundless fictions.

As I had to kill so many marsupials, particularly 'possums, for my scientific purposes, and did not find it worth while to prepare many skins of the same kind for stuffing, we undertook to tan most of the hides on the spot, to be able to use them as furs later on. Quickly we had established a little tan-yard. In the scrubs near the Burnett grows a kind of acacia (*Acacia decurrens*), the silver-leaved wattle, the bark of which extracted by water furnishes a good medium. Some of the big tins I had with me in which to pack my collections when leaving, were filled with this, and in it we tanned the skins, which would otherwise have had to be thrown away. In the course of time we tanned about a hundred opossums and twenty Ornithorhynchus, besides many skins of kangaroos, wallabies, and even of pythons. A fine 'possum-cloak, carpets of kangaroo-skin, caps and muffs of Ornithorhynchus, purses, pocket-books, and card-cases of serpent-hide, remind me and some persons dear to me to this day, of my hunting in far-off Australia and of my meddling in the tanner's art.

I had specially forbidden my men to fish in the big water-hole at the foot of my camp, lest its stock of *Ceratodus* should be depleted. Instead of this I set out some wire fish-traps brought up from Maryborough, and some wooden ones with narrow entrance-holes made by myself, in hopes of catching very young *Ceratodus*, and other interesting aquatic animals which might have evaded my pursuit till now. I, however, caught very little by these contrivances, and this little was neither interesting nor new. Small *Ceratodus* never strayed into the interior of my fish-traps.

My blacks had meanwhile been industrious at their work. Those I had engaged at Gayndah were now joined by Jimmy and his family, and by some young unmarried fellows, so that their camp once more numbered up to twenty souls. I daily received several female *Echidnas*. By examining their ovaries I made out that they were very near breeding-time, and on 23rd July I found the first impregnated egg within a uterus. The animals killed up to that date had, however, not been sacrificed in vain, as I had prepared their different parts—brains, sense organs, and intestines—most carefully. The same had been done with the marsupials,

except those which I preserved whole in alcohol. Such collections of single organs are very valuable for anatomical examination, since these dismembered parts are much easier to preserve than the whole undivided animal. For a minute examination of the brain this method is the only one available, because the brains when enclosed in the solid skull become soft, change, and decompose, ere the preserving fluid is able to reach them. In the hot climate of Queensland this decomposition takes place so rapidly that I was only able to use the brains of freshly killed animals for preserving purposes. Brains of animals killed some hours generally proved to be no longer fit for this process. I have on the whole preserved about a hundred brains of monotremes and marsupials, a difficult and tedious work which will, I hope, bear good fruit. Besides, I made a good collection of skeletons of the various marsupials, *Echidnas*, and *Ornithorhynchus*.

My blacks at this time also brought me a number of newly-laid emu-eggs and six young emus fresh from the shell. The handsome dark-green eggs, reminding one of embossed leather, are well known in Europe, where they may be seen in every collection of natural objects, often worked into table ornaments and goblets. Very similar to these, but much lighter in colour, are the eggs of the cassowary, living only in the farthest north of the continent and in New Guinea, where I collected some of them. On the Burnett we used sometimes to make an omelette of a newly laid emu-egg, and this dish meant a treat for our palates, generally accustomed to the plainest of food. One egg furnished us a portion sufficient to satisfy several hungry men.

The emu (falsely designated Australian ostrich), *Dromaeus Novae-Hollandiae*, spreads from Tasmania all over the eastern half of Australia. Another kind, *Dromaeus inornatus*, is found in West Australia. The bird is of frequent occurrence on the Burnett and not at all shy, as the settlers do not and the blacks rarely pursue it. The reason why they are thus "cut" I am at a loss to state. Later on the idea struck me that there might be some law forbidding the young and middle-aged Australians to partake of emu meat. I often saw the birds stalk about quite at their ease among the grazing cattle, not deigning me any attention, unless I rode up quite close to them. Once I had ridden with two of my men to a scrub to fetch some *Ceratodus*, which we had deposited in a tank. Our guns had been left at home, our horses were fastened near the border of the scrub. After having done our work we approached the horses, chatting in a leisurely way, when all at once we espied

two emus about forty yards before us, which seemed rather surprised than startled by our appearance. Following a sign from me my men at once stood stock-still and held their breath. The birds seemed to consider a while, they then slowly came up to us and at a distance of about fifteen yards examined us in a curious half-bold and half-stupid way. Another time a half-grown emu suffered me to approach him within about eighty yards, till he made up his mind to stalk away. I followed him on my good horse and chased him for a quarter of an hour regardless of obstacles. When I had nearly caught him up, we got to a stretch of broken ground, which allowed the bird an advantage over my horse, so that he finally eluded me, partly through my wish to spare my horse, and my reluctance to let it suffer through the pursuit of a relatively worthless game.

Of the six emu chickens the blacks had brought me, I immediately killed four, which I carefully preserved. Two I kept alive, and they played the part of poultry in my camp. During the night we drove them into a little yard; at day time they strutted about quite freely without ever thinking of running away. They were as tame as chickens and as playful as puppies. They pecked at everything exciting their attention, even at the paws, noses, and ears of our dogs, who, therefore, did not patronise their new camp-fellows. The little emus had the habit of running after everything moving quickly along, be it man, dog, or horse. It was as if they wanted to be in the midst of anything that was going on. This childish habit is a characteristic feature of the tame emu which it does not shake off even after it has reached a "grown-up" age. A squatter once told me that a tame emu he kept on his station had once nearly driven a horse to death by pursuing it within a yard. Whenever the horse jumped away, the stupid bird ran after it; the more nervously the horse hurried along, the more assiduously did the long-legged runner follow it, till the poor horse collapsed, utterly fatigued and exhausted by that silly race. The emu in question grew such a nuisance in all respects that nothing was left but to drive it away. The bold creature, however, kept returning again and again, so that at last it had to be killed.

The young emus are very different in colouring from the old birds. They are not of the modest grayish-brown of the latter, but bear a delicate design of a pretty dark gray with numerous stripes on their back and sides. A very similar design is to be seen in the young cassowaries. These stripes of the small birds fulfil

a decidedly protective purpose. Young emus are often pursued by the eagles and hawks so frequent in Australia. When (so my blacks told me) the young emus see a bird of prey soaring above them, they quickly lie down flat upon the ground. A body as big as theirs would surely be much more conspicuous, set off as it is by grass, if it were *evenly*, though ever so modestly coloured, than if its colouring be varied by stripes and spots. I myself have had occasion to notice how difficult it is to discover an emu in the grass if it nestles to the ground. On an even level of sand its stripes would direct attention towards it, whereas here they render it inconspicuous. Similar observations can be made on other animals. The lion, which haunts the open country, scanty heaths, and bare mountain regions, who has his hunting-grounds in the sand of dry river-beds, and prefers these to thickets and woods, has an even sand-like colour. The tiger, inhabiting thickets of reeds and bamboos as a native of the jungle, is handsomely striped. As regards these beasts of prey, their colour, so much in keeping with that of their surroundings, does not serve as a protection, but as an aid to its bearer in approaching game unnoticed, and for rendering itself invisible when on the look-out for it.

When the young emu grows up, it becomes too big and strong to be slain by birds of prey. Then the protective stripes of its dress disappear. Unmolested the majestic bird then wanders through the extensive stretches of bush which form its domain, and which harbour no single creature that might bring it any danger, save that most terrible of all—man. The fable that the African ostriches when pursued and overtaken stick their heads in the sand, in the idea that if they themselves do not see their pursuer, they are also hidden to him, probably has its origin in the fact that African ostriches when pursued by a rider often try to hide behind little hills or within hollows of the ground instead of taking flight. The breeding ostrich-hen also at times crouches down and remains motionless, probably as a reminiscence of its youth, when it had to evade the spying glance of the birds of prey by so doing.

My two young emus performed this feat often enough without any particular reason; they lay down flat on the ground and stretched out their legs, neck, and head. At other times they rested in a queer kneeling position, letting themselves be shone upon by the sun. The droll little fellows were almost inseparable and lived in the greatest amity. When one of them lost sight of the other, it instantly called for its mate in a loud piping voice.

A great nuisance to us in this camp were the numerous ants, having their dwellings round about us and paying us frequent visits to see whether there was anything to nibble at or carry off. The termites, however, were not quite so numerous and troublesome in the sub-tropical Burnett district as they are in the northern tropical parts of Queensland. There was a big ant-hill about fifty steps from my camp, and the busy insects had trodden a regular path between their dwelling and my own, which was always alive with ants, some setting out empty-handed, or I should rather say empty-mouthed, others returning laden with goods. As these little neighbours molested me in various ways, I tried to drive them away without destroying them. Consequently I had to avoid the usual method of burning out their nest. Instead, I strewed a handful of naphthalin crumbs all over the hill, in the certain expectation that this would occasion a general emigration. Instantly an immense excitement arose. The courageous little creatures threw themselves passionately on the nauseous and harmful crumbs, taking them up with their jaws, and, carrying them for a little space, letting them fall with disgust. Quickly others would come to continue the work begun by these pioneers, till they too were relieved by others, and so on, till after less than two hours the smallest naphthalin crumb was removed from the nest and everything went on in the usual course. I now resolved to employ some stronger means for driving away the animals, and threw down some pieces of potassic cyanide. The same excitement as before, only that now it grew impossible to remove the dangerous substance, the very smell of which brought on destruction, while its touch killed surely and at once. Nevertheless I saw many ants risk the danger, take up the poisonous crumb, fall and die. As it grew dark, I was not able to continue my observations, but expected next morning to find the place deserted by the ants and all their belongings. How astonished was I when I found the whole surface of the heap strewn with dead ants like a battle-field. The pieces of cyanide, however, had totally disappeared! More than one half of the community had met death in this desperate struggle, but still the death-defying courage of the heroic little creatures had succeeded in removing the fatal poison, the touch of which must have been just as disagreeable to them as it was dangerous. Recklessly neglecting their own safety, they had carried it off little by little, covering every step with a corpse. Once removed from the heap, the poison had been well covered with leaves and pieces of wood, then interred, and thus prevented from doing further damage. In the course of the day the corpses

of the insect heroes were carried away by the survivors, and every vestige of the battle was removed. The considerably reduced little people enjoyed unmolested from that day the possession of their so courageously defended home. For the heroism of these insects—which far surpasses what any other creature, including even man, has ever shown in the way of self-sacrifice and loyalty—had made such an impression on me that I gave up my campaign, and henceforward I bore with many an outrage from my neighbours rather than destroy the valiant beings whose courage I had not been able to crush.

Another cohabitant of our camp was a big reddish-brown wasp (Pelopoeus?), which, continually flying hither and thither most busily, stuck its nest, which it constructs of sand grains, into every nook, into the corners of our tents, into empty chests, and once even into the leg of a boot which had for some time been lying unused in a corner. In the inside of these nests, which are stuck flatly into corners, one finds a quantity of spiders of medium size. The miserable animals are not dead, they are only paralysed by the poisonous sting of the wasp and unable to move. In the body of this unhappy victim the murderous insect deposits its egg, the young growing wasp living on the juices and flesh of the paralysed spider. These wasps never used their sting against us, even if we drove them away or tried to catch them. The dense tea-trees of the river-beds were also haunted by a kind of wasp, *Polistes ferrugineus*, and by hornets. With some of the latter, a nest of which I must have disturbed without knowing it, I once had a tough battle, which ended in my saving myself by a most inglorious and rapid flight. Really dangerous may these creatures become to the horseman, whose animal they sometimes render wild and raving mad by their sting.

More poisonous than all the other insects of Australia, than the uncouth scorpions and the enormous and valiant *Scolopendra*, is a little black spider, with a back of vivid red, *Latrodectus scelio*. This conspicuous spider seems to be everywhere. Though chiefly nocturnal in its habits, it also appears in daytime, imposing on you by a certain calm impudence. It takes no trouble whatever to escape or to hide, but relying on its fatal poison seems rather to warn you by its vivid colour than to elude your vision by a more modest mien. The bite of this spider is terribly painful, and in its wake we often find paralytic symptoms in the wounded member, its neighbouring organs, or even the entire body. It is said that grown-up people are sometimes killed by it, and surely this is the most poisonous spider in the world, and the most dangerous arthropod in existence.

After having found the first pregnant *Echidna* on the 19th July, I considered it best to lay chief stress on the pursuit of that animal during the weeks to come, and to complete the embryological series for which I had begun to collect material the year before. Everybody told me that the hilly country east of Cooranga, near the source of Tim Shey's Creek, an affluent of the Boyne, was particularly rich in *Echidna* and marsupials of all descriptions. The Creek itself was much too small and insignificant to serve as a home for *Ceratodus*, and since the time of the latter had not yet arrived, I left Dahlke and little Balthasar Haupt in the big camp on the Boyne to look out for it, whilst I myself, Andrew Wein, and Edmund Haupt followed the blacks into the mountains.

We had great difficulty in approaching our goal with our load, rugged granite mountains broken by gorges, hillsides covered with mighty rocks, and thickets of acacia making the progress difficult even for a horseman, much more so for us, who had to haul along our heavily-laden dray. Without the cleverness of our blacks, who always managed to detect some aperture through which we were just able to pass, we could never have reached our destination. Such as it was, our progress was slow enough. But on attaining the height we found ourselves rewarded for our toil. We stood in the midst of highlands crossed by pretty valleys and abounding in water, where the grass richly thrived, mighty eucalyptus trees fringed the banks of the creeks and gullies, and crowned the round heads of the granite hills which sloped gently down towards the valleys. Everywhere little ponds and lakes enlivened the scenery. They were peopled by many waterfowl, wild ducks and geese, which felt themselves safe from disturbance and pursuit, and were therefore not in the least shy or cautious. This was the case, however, only until our appearance; quickly enough the clever birds learnt to recognise in us their sworn enemies, from whom they protected themselves by redoubled vigilance. Here and there the country showed extensive and very dense scrubs, abounding in *Echidnas*, wonga pigeons, and scrub turkeys. The rich grassy plains were alive with bandicoots and kangaroo rats—the whole a real paradise for the collecting naturalist. The weather also was as agreeable as it possibly could be at this time of the year; it was dry, not too hot during the day, not too cool at night. On my return to the Burnett in the beginning of July we had to suffer somewhat from chilly nights, particularly I, who had just returned from the tropical North. On the Burnett, which lies nearer to the equator than the Canaries, Suez, or Cairo, the cold of winter makes itself felt only during the night, while

the days, from two hours after sunrise till sunset, are generally warm and fine. At night, however, the thermometer is apt to fall to freezing point, and he who does not know how to protect himself feels very uncomfortable on his chilly bed, suffering mostly from the cold, which pierces from below through the thin stretcher used as a couch. Against this a remedy lay ready at hand. An empty sack was filled with dry grass and laid on the stretcher like a mattress. By covering myself up with a warm blanket I felt quite comfortable, save for the narrowness of my couch, which allowed my blanket to slip off as soon as ever I moved in my sleep. Thus I was often awakened by the icy cold which seized the uncovered parts of my body. During the coldest nights I tried to sleep in a sack, as the travellers in the Arctics are wont to do; but I felt too shut up thus, and henceforward tied my blanket to the stretcher in several places and then crept into the husk formed by mattress and covering. My blacks used to be in a half-benumbed state in the chilly morning hours following a cold night, reminding me of lizards and snakes awaking from their winter sleep. Only the sun's rising in the sky was able to spur their vital powers to activity once more.

I had this time every reason to be pleased with my blacks. Three of them—Jimmy, Mackenzie, and Johnny—did first-rate work, and also the others—John Bon, Tommy Dod, and even fat, lazy "Old Tom"—frequently brought me home a good yield. Some of the women worked even better than the men. Thus we wandered about from place to place, shifting camp very often. I generally made the blacks repair to a new spot two days before me, following them only after they had made sure that the new hunting-ground would prove profitable. During this time I noticed that the blacks when returning to an old camp never raised their humpies in quite the same place as before, but put up a new roof at some distance from the old one, using either the old bark or some freshly-felled material. I could not see any good reason for this, and my questions did not evoke any satisfactory answer. On the whole my blacks—differing in this point from those of other Australian districts—were not over ready to communicate to me the customs of their tribe, though they found great pleasure in telling me the names of animals, plants, and other objects in their native tongue, and seemed greatly pleased when I used the right terms in the right place. I imagine, however, that their habit of never camping in quite the same place again is founded on some superstition.

Further, I remarked a certain separation into parties when they settled down in a camp. Jimmy, his family, and Old Tom always

Ada and Jimmy

camped apart from the others, and kept aloof from them in every way. This was not in consequence of their not belonging to the same tribe, but for another reason, which I made out later on. Several years ago Jimmy's brother had been murdered by two blacks belonging to my camp, Mackenzie and Johnny, and it was universally believed that Jimmy would take vengeance for this deed as soon as an opportunity offered. He had once been a celebrated warrior, and his body showed the scars of terrible fights. One cut, yet to be seen on his neck, went nearly as deep as his backbone. Once he had had to defend himself against three assailants at a time, when he made such good use of his mighty wooden club (called a "djibir" on the Burnett, "noella-noella" in other districts), which he was an adept in handling and throwing, that the three heroes finally took flight. As he laughingly told me, they would have had easy work to kill him, for one of their spears had pierced his shield and nailed his left hand to it. Not being able to extract the spear, he had broken it off; but of course he had great trouble in handling his shield, and had therefore to avoid the spears of his enemies by jumping aside. Happily his assailants had not noticed his being wounded, and thus his endurance, agility, and courage saved him. He had on the whole led an adventurous life, had ridden all over the farthest North as one of the black police, following the track of fugitive criminals and mutinous natives, and could talk about his adventures in an interesting way and with much common sense. He and his wife Ada liked to pay me visits in my tent. On these occasions Jimmy, crouching upon the ground, used to spin long yarns about his past life, and about the habits of animals and the best way of hunting them. He was by far the best huntsman of all my men, and by his acuteness and experience he bagged double as much game as the best of the others, although age had weakened his strength and diminished his agility. In spite of this he would have been a match for any of the younger men in a fight. It made me somewhat uncomfortable to hear about the past murder and the threatened revenge, for a quarrel amongst my blacks in the camp would have brought me serious difficulties and fatal complications. Good judges of the blacks, however, assured me that Jimmy would wait for a "Corroboree," one of the great gatherings of the natives, for executing his revenge, provided he was given a chance, but that he would not do so in the course of our camping out if he were not incited to it by liquor, which I was now wise enough to keep out of reach. Jimmy really kept out of mischief as long as I had my blacks with me, and Mackenzie was killed by

the club of another native a year after. Jimmy and Johnny, so far as I know, are still alive, still roaming in the bush, still hunting wallabies, 'possums, and bandicoots, still searching the dense Australian scrub in the pursuit of *Echidna*, to them as enticing an object of *culinary* interest, as it was of *scientific* importance to me.

My wish to become acquainted with the habits of *Echidna* and the native method of catching it, induced me often to accompany the blacks for days together on their hunting excursions. Mostly I joined Jimmy and Ada, my particular friends. The blacks used to start some hours after sunrise, when the sun stood high up in the sky, and his rays had dried up the dew and warmed the air. The different families started each by itself and in various directions, Jimmy's set making a group of six. They were accompanied by several dogs, and carried with them an aged billy from some squatter station, besides they took tea, sugar, and damper from our provisions, since they never returned before sunset. While the women and girls were made to carry the loads on these excursions, as on all more extensive wanderings, men and boys strolled along without any such encumbrance. The men while walking let their eyes roam about everywhere, noticing each track, and listening for every sound. On a grassy plain, on which our own eyes would wander helplessly, the falcon sight of the black will detect the trace of a kangaroo-rat. His eye, following the course of the track, soon perceives some two hundred steps distant, the little marsupial comfortably settled in the high grass. Stock-still stands the hunter, while the women and children remain immovable, or fall silently to the ground if the game happens to consist of bigger animals like kangaroos or wallabies, which, thanks to their size, are visible over a wider area. If a covering by some bushes or hillocks be at hand, then the hunter will stalk up to the game in an upright position, every muscle strained, each sense worked up to the utmost pitch of vigilance. Never will a twig crackle beneath his feet, never a bush rustle by his touch, so well does he calculate every movement, so keenly does he watch his immediate, as well as the farthest surroundings. If there be no cover at hand, then, always observing the wind, he will crawl up to his game slowly and with a snake-like movement till he is within shot. Then—off goes his wooden missile, which kills with as deadly a certainty as would the ball of the most expert rifleman.

Stalking is considered among European sportsmen as the highest, noblest, if most difficult kind of chase, and indeed it is. But it is the most natural one as well. It demands keen senses, a thorough

knowledge of the traces and habits of the game, an absolute command over one's own body, steadiness, patience, and presence of mind. There is a curious irony in the fact that a method which the highly cultured European regards as the summit of noble huntsmanship, in which only the ablest and most experienced sportsman deigns to take part—is practised in far higher perfection by one of the lowest races inhabiting the earth. For it is quite certain that no European sportsman, no American trapper, no Australian bushman can compete with an Australian native like Jimmy, who is uncontaminated by the influence of the whites. Our entire education, our whole life and mode of thought puts too great a distance between us and Nature to enable us to understand and judge her slightest symptoms so well as the native son of the bush, whose ideas are concentrated on these very affairs. Not every "savage," however, is a good huntsman. The agricultural Papuans, the intelligent Malays, the African negroes are very indifferent sportsmen. They grow up in houses and villages, till their acres, and cultivate their plantations, and are sometimes good fishermen; the chase of game in the real sense of the word is, however, of subordinate interest with them. To procure themselves venison, they rally for a battue or catch the game in nets, traps, and pits. The Australian, on the contrary, who never thinks of the day to come and does not possess other sources of food than those offered him by the bush in the shape of game and of scanty fruit, develops an eminent skill in obtaining his prey at any moment without the help of others, and without any complex contrivances, the efficiency of which is dependent on chance.

This mode of living makes him the most independent of men, but it also stands in the way of all progress, forcing him to roam restlessly over wide areas, and to employ artificial means against over-population. Agriculture alone would enable this country to nourish a denser populace.

On watching the children, particularly the boys, I always noticed that all their games and exercises tend towards developing their hunting faculties. Continually they are occupied in throwing sticks and small clubs at all sorts of marks, in killing lizards by their aim, in stalking marsupials, and stealing upon young birds. During their wanderings, while the women and girls carried the burdens, the boys kept amusing themselves with games of this sort. On the whole, they may be said to enjoy every possible liberty, and children of both sexes receive far better treatment than the grown-up women.

When, some hours after starting from the camp, a family of blacks reach their destination, they at once settle down, light a fire, eat, and rest. Some hours elapse before they go to work in good earnest. The women, save Ada, usually did not take part in the hunt. She alone used faithfully to help her husband. Accompanied by his dogs, the black begins to examine the scrub, looking for tracks of *Echidna* and for traces of its digging. If he has found any he follows them wherever they may lead, hither and thither, through thickets and underwood, across sands, grass, and naked rock. Our own eye would often be unable to see the slightest vestige of a track; even if pointed out to us, put under our nose, so to say, we should fail to perceive it. To the eye of the native, practised and trained from his tender youth upward, the smallest token, as for instance a little stone, the moist and, therefore, darker outside of which proves that it was but recently overturned, or some bent blades of grass, will suffice to indicate a track, which he, even on horseback and riding along at a sharp pace, will manage to keep in view and to follow. The pursuit of *Echidna* tracks is by no means an easy task, as its nocturnal roamings in the scrub, and its running backwards and forwards in the search of ant-hills often produces a weird labyrinth of marks crossing each other. The darkness of the scrub, the density of the brushwood, make it doubly difficult to see these signs and to follow them. Often the tracker has to wander for two or three hours, to wind himself through thickets of acacias, to climb over fallen trunks, his attention always on the alert, lest he should lose the thread—till at last he finds the prickly fellow asleep in a hole in a rock or in a self-dug cave. In three cases out of four it will prove to be a male, these being far more numerous than females. As males, however, were of little value to me, I gave the blacks only a trifle for them, and sometimes did not even accept them from the finder. This used to be rather disappointing to the men, but they found some comfort in the good roast, the "Canara" (as the Burnett natives call *Echidna*) furnishing a delicious meal in their opinion. Some white men think the same; I, however, am unable to participate in this taste, as the meat of *Echidna*, to my palate, possesses a very disagreeable smell and flavour. The blacks prepare the meat in a similar fashion to that employed by European gipsies on the hedgehog. The animal is hulked but not skinned, then it is roasted with skin and quills above the fire or in hot ashes. Its subcutaneous fat, which is much developed before the rutting season, but disappears during that, is considered a particular dainty.

In searching for *Echidna*, the dogs of the blacks were of great use to us. Some of them took up a track of their own accord, working along the same till they found the burrow of the beast. I generally found that when a native set out with a good dog, both of them eagerly applying themselves to their task, the chances of success were about the same for man and dog. My best huntsman, Jimmy, with his dogs, usually captured two or three, rarely four animals a day, but hardly ever did he return empty-handed. Also Johnny and Mackenzie regularly brought some booty. The rest were not to be reckoned upon with anything like certainty. It was impossible for me to follow my men one by one, to ascertain whether they were at work, or whether they were idling about in the scrub, lying on their backs, or searching for "sugar bags." Many an hour destined for labour did they spend in the pursuit of these bees' nests. Still greater was the loss of time when they discovered a nest of our European honey-bee. Mr. Cole, the doctor in Gayndah, was an eager apiarian, and from his hives European bees, which soon became wild, had spread all over the Middle Burnett. The conditions for their livelihood seem very favourable in these parts, whereas in tropical North Queensland they cannot live freely without being taken care of by man. Whenever it happened that my blacks discovered a tree which the immigrated bees had chosen as a dwelling, and the hollow of which they had filled with their sweet stores (often to a height of eleven yards or so above the ground), all the mob would at once assemble to fell the mighty tree, often the work of a day. As to myself, I only heard about these enterprises after the tree was felled and the day lost.

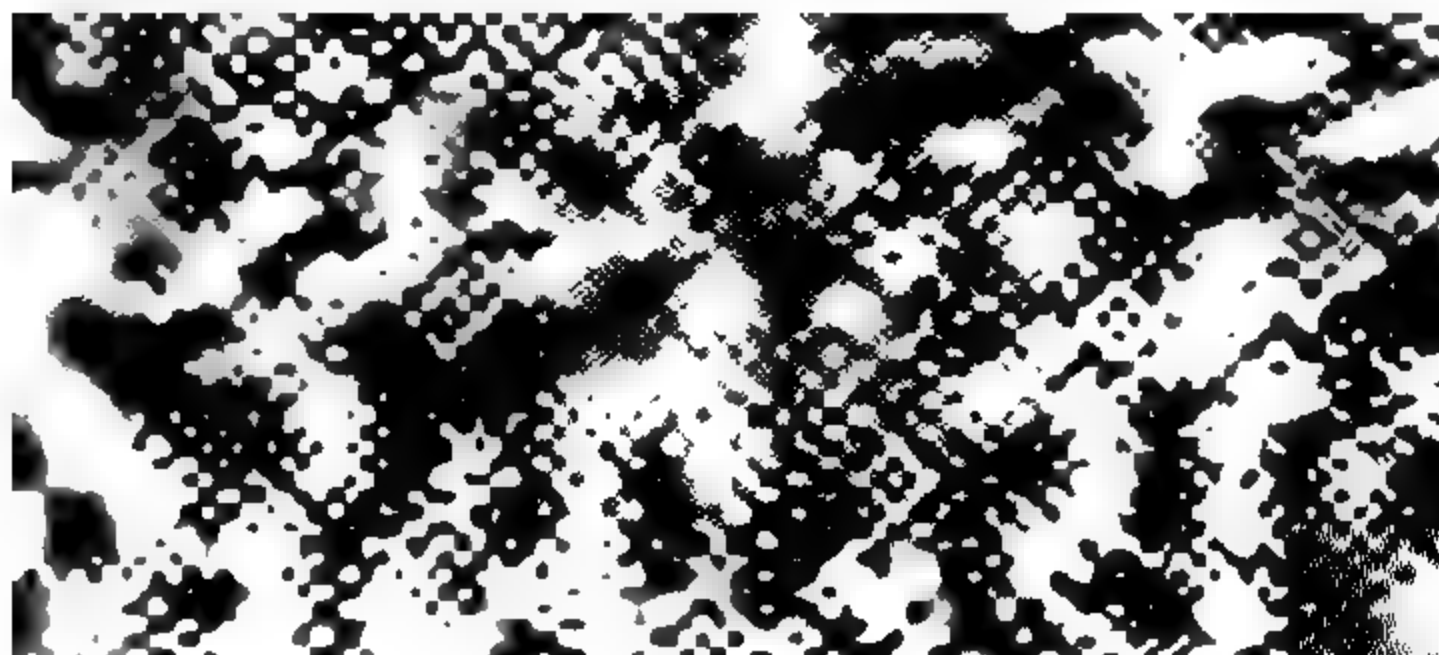
The blacks went out for *Echidna* only by day. Its haunts were too impracticable for a nocturnal chase, and would force the huntsman to rely entirely on his dogs. Besides, nocturnal pursuits are not to the liking of the Australian native, who is far too superstitious to ramble about, to hunt, or to enter a scrub by night.

The New Guinea Papuans of Hula, however, set out for me one night to procure me the Papuan variety for which I had promised a high price. Although a great number of natives went off with many dogs and spent all night in the pursuit, they did not get a single *Echidna*. It seems that their skill and experience in hunting is entirely limited to the chase of the kangaroo.

The principal aim of my stay on the Burnett being not only the study of *Ceratodus*, but of the two oviparous mammals: *Ornithorhynchus* and *Echidna*, I beg my reader to allow of my giving a few statements as to the nature of the latter animal, despite my having perhaps tried his patience with regard to the two former.

The oviparous mammals or Monotremata are now geographically limited to the Australian region. Fossil relations of theirs, the Multituberculata (Allotheria), have been discovered in the Trias of Europe and South Africa, the Jura of Europe and North America, in the upper Cretaceous beds of North America, and the lower Tertiary of Europe, North America, and, perhaps, South America. Together with another nearly-related group, the Pantotheria, these Multituberculata represent the oldest known species of mammals. Their appearance within the Trias marks the first appearance of mammals upon earth.

If we unite Monotremata, Multituberculata, and Pantotheria into a class of Primitive Mammals (Prototheria), we may state that the



Australian Echidna (*Echidna aculeata*, var. *typica*).

Prototheria, which coincide in many points of their organisation with reptiles, flourished during the Mesozoic Period and died out at the beginning of the Recent, except for two types, Ornithorhynchus and Echidna, which have to our day outlived the rest as a scanty remainder in Australia and some of its neighbouring islands. Echidna is represented by two genera: the genus Echidna, which contains but one single species, *E. aculeata*, and lives as three different varieties in Australia, Tasmania, and New Guinea; whereas the genus Proechidna, with one species, *P. bruiinii*, is confined to New Guinea. Thus its distribution ranges from temperate Tasmania, which has an average winter temperature of 47° , and is sometimes exposed to snow, almost up to the equator. The extension of *Ornithorhynchus anatinus* is much more limited. Its only species inhabits the south-east quarter of Australia and Tasmania, but it is absent in the west and in the northern parts

of the east, beyond the 18th degree of south latitude, as well as in New Guinea.

Even within their geographical range the shy Echidnas are by no means frequent. Their only haunts are dense impenetrable scrubs and primeval forests, and wild rocky parts of the country. Very rarely some single individuals are met by chance in the open bush, and will shift even from the densest scrub as soon as they are disturbed by proximity to human habitations. Thus I only received one single specimen during my week's stay at Gayndah, wherefore my blacks refused to search the scrubs of that neighbourhood for it any longer.

But even in surroundings where the animal is more frequent, man may live for years without meeting one, and many colonists, who know every animal and every plant in the bush, will have only quite rarely seen a spiny ant-eater. This fact is due not solely to the habits of the animal and to its being mainly, if not wholly, nocturnal. Most marsupials living on trees, like the well-known Australian opossum (*Trichosurus*), the flying-squirrels (*Petaurus*), and others, are nocturnal likewise. Still, everybody knows them, and they belong to the characteristic features of the Australian moonlight landscape.

As to Echidna, its invisibility arises chiefly from the inaccessible nature of its abodes, and its precaution and noiseless movements. As soon as it suspects any danger, the animal will stop its progress and vanish into the ground, noiselessly, as if by magic.

On its nightly expeditions the ant-eater seeks worms and insects of all kinds, which it extracts from their hiding-places in earth-holes between stones and rotting bark, by means of its long worm-like tongue. Its principal food, however, consists of ants, which it captures like other ant-eaters by thrusting its tongue into the ant-hill, waiting till it is covered with ants, and then drawing it in quickly. The outer skin of Echidna is so firm and thick that it shields its bearer like a cuirass, against the bite of the ants, which are in Australia represented by very warlike and well-armed species. This coat offers no defence, however, against the numerous ticks of the Australian bush, and I rarely found an animal without these parasites, while in the intestines of Echidna I often found a peculiar sort of tape-worm, *Taenia echidnae*.

My reader must now allow me to enter somewhat more closely into the intellectual faculties of this lowest of mammals, which have, up to date, been very insufficiently studied. The brain of Echidna is conspicuous for its size, considering the lowly position of the animal in the zoological scale; in proportion to the size of the

body, it is more voluminous than that of marsupials, and it is further remarkable for its degree of convolution and the fissures (*gyri* and *sulci*) on its surface.

It is very difficult to form a just idea of the inner life and intelligence of creatures, the organisation of which is so unlike our own. In no sphere of knowledge have we so much difficulty in giving up the anthropocentric point of view as in comparative psychology. The conclusions we draw from the behaviour of an animal, as to its intelligence, are mostly very superficial, simply because we so rarely have an insight into the mainspring of its actions. The outer world is sure to reflect itself quite differently in a creature receiving impressions through media so unlike our own, and the senses of which, while as to smelling, hearing, and feeling, much superior to ours, are as to sight quite otherwise developed. An animal which accustoms itself slowly and with difficulty to the changed conditions of its imprisonment, must not on that account be termed stupid; one that is tardy in reacting to a stimulus which strongly affects ourselves, must not for that reason be thought dull.

An imprisoned Echidna, in fact, appears both dull and stupid, if we apply this crude human standard. Its great shyness prevents it from becoming tame, though in time it will accustom itself to its keeper. Its intelligence is decidedly superior to that of any reptile, though far inferior to that of birds and higher mammals, and probably also to that of most marsupials. It will try to escape from imprisonment by all means, and will show great energy in so doing. During the day it will keep quiet in its prison and seem resigned to fate. At night, however, the seemingly indolent creature will awake from its lethargy and reveal miraculous agility and power. It will soon succeed in climbing out of its chest, throw off the lid, if this be fastened on too loosely, and will break and split any box the planks of which are not quite closely nailed, by means of its powerful extremities. As I paid my blacks the full price, fixed by me, for living specimens only, and the men were not always able to return on the same day from their extended wanderings, they were often obliged to keep the animals imprisoned during a night, without having any proper boxes or cages at hand. The better to ensure capture, they often bound the Echidnas by strong cords tied to one or two of their legs, but the little beasts nearly always managed to strip off these fetters during the night, fast though they were knotted, executing the feat with total disregard of their own skin. The blacks were very angry about the losses caused in this way, and furthered their ends by piercing the legs of the animals, and

pulling the strings through the wound. This method proved efficient, but was so cruel that I forbade its practice as soon as I heard of it. I gave the blacks instead some sacks into which they might tie the animals over night. When these were closed, and the men careful in tying them up, they served my purpose, but whenever the men were careless in closing one, the energetic animal succeeded in regaining its liberty over night.

On one of these occasions I was able to make an interesting observation as to the local instinct of *Echidna*. A captured ant-eater was carried from its scrub to camp, a distance of four miles, enclosed in a sack. At night it succeeded in taking flight. One of the blacks followed its track, which led in a straight line to the point, some miles' distant, where the animal had been caught. Not far from there the creature was found peacefully slumbering in its self-dug burrow. Considering that the animal had been carried to camp in a sack, and that it returned to its old abode in a straight direction, it seems most likely that it was its nose which led the way. Particularly during the rut, both sexes produce a most conspicuous odour, which is probably destined to favor the mutual approach of the animals and enhance sexual excitement. This very odour gives the meat of the animal, when roasted within the skin, its peculiar, and in my opinion, very nasty taste.

Considerable interest attaches to the presence in the male of both *Ornithorhynchus* and *Echidna* of a powerful spur with a related gland, situated on the inner side of the hind foot. Not one among the hundreds of *Echidnas* that I handled ever attempted to use its spur in defence. Its chief protection consists in its making a ball of itself and retreating quickly into the ground, a defence strong enough to save the wary and cautious animal from the pursuit of almost all its enemies. While thus I was unable to furnish a new observation on the functions of the aforesaid spur in the spiny ant-eater, I found on my return to Europe that while I was in the South Prof. Martin of the Sydney University, and his pupil Mr. Tidswell, had, by experiment, proved the secretion to be in *Ornithorhynchus* poisonous during June, and advanced facts which justify the belief that the whole apparatus may constitute a weapon of offence by the males when conflicting for possession of the female.

Monotremata rut only once a year. As for *Echidna*, as a rule only a single egg is impregnated and developed at a time. Among sixty pregnant females, which I examined, I, however, found one carrying two young. The right ovary and the right oviduct do not outwardly show any signs of degeneration, like the corresponding

organs in birds; during the rut, both organs undergo a visible increase in size, and I was able to prove that the right ovary produces eggs as well as the left. These, however, never attain perfect maturity; only the left side functions during propagation, and never did any *Ornithorhynchus* or *Echidna* which I opened contain an egg in its right oviduct.

Once impregnated, the egg becomes surrounded by a shell, and grows within this by receiving nutriment from the tissues of the mother animal. This is markedly different to the conditions obtaining for the eggs of reptiles and birds, which, after the formation



Echidna aculeata. 1, Egg (natural size); 2, Egg (enlarged) opened, disclosing the embryo in its serous covering; 3, The embryo when taken out of the egg, with the serous covering opened.

of the shell, do not receive any substance from, or grow any larger within the maternal oviduct.

When the egg of *Echidna* is laid, it is of about $\frac{5}{8}$ of an inch in diameter, and contains an embryo of about $\frac{1}{8}$ inch. The shell is of a leather-like substance, and is not calcified. Thus it is very remindful of a tortoise egg. A chemical analysis of my material, made by Professor R. Neumeister, has proved that the shell, like the eggshell of reptiles and the organic basis of a bird's egg, consists of horny substance or keratine.

After the egg is laid, the mother stows it away in her pouch, which is always developed during the rut, whereupon it disappears, only to reappear again when the next rut approaches. It is

interesting here to note that the pouch first appears in the embryo, but is hereafter lost to sight until the beginning of the first rut.

In this disappearance it ought, therefore, to be considered as merely becoming latent, and interesting morphological conclusions may be drawn from the fact. A closer consideration of these phenomena, however, lies beyond the limits of this book.

I believe that the mother *Echidna* transfers the egg to her pouch by means of her long muzzle, and not of her clumsy extremities and by pushing it in along the ground. The narrowness of her mouth

Two stages of the embryo, from pouch-eggs of *Echidna*; one quite young, and one shortly before hatching. The latter has a horny thickening or "egg-breaker" on the end of its snout for breaking the shell (enlarged).

prevents her from putting it into her pouch with the help of her lips, as marsupials are wont to do with their embryos. I have never watched the process with my own eyes, however.

Once secured in the pouch, the embryo, which has in the meanwhile attained a length of half an inch, soon breaks the eggshell and is born. Its eyelids at this period are still closed. Like birds and reptiles, the embryo monotreme has a horny thickening or "egg-breaker" at the point of its snout, with which to burst its shell. The shell after being broken is instantly removed by the mother, and the embryo now lies free in the pouch. It cannot attach itself by sucking, as the *Monotremata* do not possess real teats. The milk which is produced is licked, not sucked, by the young animal. I always found the alimentary canal of the young filled

with a quantity of white milk-like substance. In the stomach of some individuals I found, instead of that fluid, a solid clot, and when I preserved the animals in spirits of wine, the liquid contents of the stomach, or "milk," always coagulated into a solid cheese-like substance. The whitish colour of the fluid is caused by the presence of numerous fat-globules.

Professor R. Neumeister has had the kindness to examine chemically the coagulum for me. It proved to be an albuminoid, containing neither sugar of milk, nor phosphoric acid.

Thus the milk of Monotremata seems to differ somewhat in its chemical composition from that of higher mammals. For though I cannot exclude the possibility of the sugar of milk having been artificially removed by the alcohol in which the animals were preserved, the absence of the phosphoric acid cannot be explained in the same way. The young animal undergoes its further development inside the pouch, till it has reached a length of about 3 to $3\frac{1}{2}$ inches, at which period its quills just begin to break through. From the middle of October my blacks found several such older specimens outside the maternal pouch in little hollows of the ground. Considering that the first mature females were found at the end of July, the first young ones outside the pouch in the middle of October, one can with tolerable certainty calculate a ten weeks' period between the impregnation of the egg and the disengagement of the young one from the pouch.

An older pouch-specimen of *Echidna*, shortly before leaving the pouch (natural size).

The blacks all told me that the "old woman" (as the natives call the mother animal) during the first weeks often returns to the young one to take it into her pouch and suckle it. On entering

upon her nightly rambles, however, she deposits her weighty and inconvenient youngster, digging a little burrow for it, where she stows it away until her return from her roamings. I was able to substantiate this statement by finding fresh traces of the old *Echidna* near the resting-place of the young one, and the presence of milk in the stomach and intestine of the latter.

Thus we observe, in this lowest of mammals, an attention to its young similar to that practised by its relation the Platypus, exceeding the period of the little one's sojourn within its mother's pouch.

My observations as to the propagation and development of the Monotremata, upon which in this book I am only able to state a few facts, have perfectly confirmed the views hitherto formed concerning the position of these animals in the zoological system, and which had been up to that date founded almost exclusively on facts derived from comparative anatomy. They are creatures of a more primitive structure than the other mammals. Their character as mammals is, however, so obvious that there can be no doubt about their belonging to this class. On the other hand, their conformity with reptiles is so conspicuous and important that the old view, which places them as the "missing link" between the former and mammals, appears well grounded; though we must assert that this link is not situated exactly in the middle, but lies more towards the mammalian end of the chain.

This intermediate position can be further substantiated by study of the physiological side of the animal's life. The investigations of the Russian naturalist, Miklouho-Maclay, had shown that both genera of Monotremata possess a lower bodily temperature than all other mammals. On my repeatedly measuring *Echidnas*, I further noted the surprising fact that their temperature varies to a much greater extent than that of higher mammals. While in the latter the temperature is almost constant, only varying in fractions of a degree, in Monotremata there seem to occur oscillations of 12° and 13° or more. A relation between these changes and the changing temperature of the outer air could, however, not be proved.

Thus it appears that Monotremata must neither be reckoned among the "poikilothermal" animals, whose temperature changes with that of the outer air, nor strictly among the "homoiothermal," which maintain a constant temperature, but that, physiologically speaking, they represent a link between poikilothermal reptiles and homoiothermic mammals.

Whilst I rarely accompanied my blacks on their search for *Echidnas*, I often rode out by myself to shoot some smaller mar-

supials which were frequent about us. For this hunt I had procured two fox-terriers at Maryborough, "Jack" and "Topsy," which proved excellent starters. In the high grass of the open bush the Kangaroo-rat (*Aepyprymnus rufescens*), the "Barunga" of the blacks, hides its semi-globular, well-appointed nest, in which it takes its nap during the heat of daytime, covering itself comfortably and carefully with grass. But when darkness has set in, it will rise and look for its food, which consists of grasses, better still of roots and bulbs, which it scratches out of the ground by help of the sharp claws of its fore-feet. It resembles a kangaroo in miniature, and like this it hops along in agile leaps. The rap-rap of its hind-feet on the ground sounds through the stillness of the night; clearly audible already from the little "rat," it is louder from the wallaby, resounding far and wide when occasioned by the heavy kangaroo. How often, when lying on my couch, have I heard these sounds, most frequently the hopping of the bold kangaroo-rats, which used to pass close to my tent quite fearlessly. A pair of good dogs can easily catch them. I often saw female kangaroo-rats, which carried young ones in their pouches but wanted to fly away, deliver themselves of their burden in a most unmotherly way by giving it up to the dogs, to be able the better to escape themselves. Never did I find more than one young one. When sharply attacked, the kangaroo-rat retreats into some hiding-place, mostly into one of the numerous hollow trees lying about throughout the bush. Its size being considerable, it does

Kangaroo-rat (*Aepyprymnus rufescens*)—about one-third natural size.

not always find an adequate hiding-place, and smaller dogs will generally manage to follow it and draw it out.

This creeping into hollow trees is, however, a regular trick of the Bandicoot (*Perameles obesula*) when pursued. My blacks called this peculiar pointed-nosed marsupial, an intermediate between herbivorous and carnivorous marsupials, "Pinuru." It also has its lair in the high grass of the bush, and spends the day sleeping in it. At night it comes forth, searching the upper portions of the ground for beetles, worms, roots, and bulbs. Every night my camp received the visit of one or several bandicoots, which picked up small remnants of meat and bread from the ground without indulging in encroachments of any sort. Every morning we found the fresh

Bandicoot (*Perameles obesula*)—about one-third natural size

traces of our harmless guests all around our cooking-place and "dining-hall," particularly during my first stay on the Burnett, when I had no dogs with me in my camp. The animals were at that time on such good terms with us that they came up to our very feet, when, of an evening, we sat smoking our pipes and enjoying the cool air. In clear moonlit nights I sometimes heard the grunting cry of the male as he set out on his nightly love-making.

When dogs startle a bandicoot out of its lair, it will not engage in a long chase, but only run as far as the next hollow trunk, into which it creeps. It is able to force its body into very narrow holes, where no dog can follow it, and seems to know every available hiding-place in the neighbourhood of its dwelling. As soon as the bandicoots I chased had disappeared in this way, Jack and Topsy used to blockade the entrance-hole, while I thrust a stick into the hollow to see how far the animal had retreated. Thereupon I, with

my tomahawk, cut a hole in the place where I supposed it to sit. In case the trunk of the tree is thick, and its wood hard and not

Native Cat (*Dasyurus hallucatus*)—about one-third natural size

Bush Mouse (*Antechinomys lunger*)—natural size.

yet rotten, this is pretty heavy work, lasting sometimes half an hour or more and causing one's hands to become badly blistered. The

worst job was the extracting of the animals from the inside of one of those mighty fallen trees, which had a wide entrance leading into a cavity which narrowed almost to a point. Eager little Topsy sometimes entered as deeply as possible, and finally got so squeezed in that she could not escape. Her pitiable whining allowed me to ascertain the place where she was imprisoned. To split such a giant tree with a tomahawk was, however, impossible, so I had to ride back to my camp—a journey of several hours—to fetch a strong axe, and so release the reckless little dog with the sweat on my brow.

Sometimes my axe brought forth from these hiding-places no bandicoot, but the "Native Cat" of the colonists (called "Gumbem" by the blacks), a genus represented by two species in the Burnett district, *Dasyurus hallucatus* and *Dasyurus Geoffroyi*. The native cats are small but bold and bloodthirsty animals, which waylay smaller mammals and birds and do not despise insects. They are very much hated by the settlers, as they like to pay nightly visits to the hen-roosts, like our martens, helping themselves to their chicken quite as a matter of course if not prevented by the owner. More harmless are the little marsupial Bush Mice, which have their nests in faggots, dry leaves, or rotten wood, and live principally on insects, and such are the common *Sminthopsis crassicaudata* and the rarer *Antechinomys laniger*, of which latter I captured but one specimen.

In Tasmania we find carnivorous marsupials of a much larger and stronger type; the Tasmanian "Devil," conspicuous by its ferocity (*Sarcophilus ursinus*), and the ravenous "Pouched Wolf" (*Tylacinus cynocephalus*), the deadly enemy of the settlers' sheep as well as of the fleet kangaroo, the prickly Echidna, and the aquatic duck-bill. Species nearly related to both these large carnivorous predatory marsupials lived on the Australian continent during the Pleistocene Period, but they became extinct long ere the white man entered the country. What can have occasioned the extinction of these valiant creatures, which can never have suffered from want of food on a continent so rich in game? Most probably the appearance of a rival, the yet better armed and intellectually superior "Dingo," the Australian dog. This animal, brought to the continent by the blacks on their immigration, soon grew savage, spread over all the country, and caused the disappearance of those marsupials which were its rivals in matters of livelihood, thus, in the first place, *Tylacinus* and *Sarcophilus*. Into Tasmania the dingo has never entered, therefore the above predatory marsupials have been able to survive there unto the present day.

The history of the other continents shows us that marsupials,

which we have to regard as more highly organised descendants of the Prototheria (Monotremata and their allies), were, together with the latter, the only representatives of mammals on earth during the Mesozoic Period (Trias, Jura, and Chalk), the Middle Age of geological history, and that this fauna reached its climax at the commencement of the Tertiary Period in the Lower Eocene. At that time, however, still more highly organised so-called placental mammals began to appear in the Old World and in America, animals showing in their general structure a far greater development, and which bring their young ones to the light in a maturer state, the mother being able to nourish them before their birth by a particular internal organ, the placenta. This is wanting in oviparous Monotremata and marsupials, both of which bring forth quite undeveloped young ones. Many anatomical and embryological facts lead us to suppose the placentals to be the descendants of marsupial-like forefathers. Now we see on perusing the stony annals of the world's history, that the higher the organisation of placentals becomes, and the more they spread and gain in numbers, the more do their forefathers, the primitively and less perfectly constructed marsupials, begin to diminish, getting rarer and rarer till in the Miocene Period of the Old World they finally die out completely. In America alone two families of marsupials, represented by *Didelphys*, the genuine or American Opossum, its aquatic ally *Chironectes*, and an anomalous phalanger-like animal the *Coenolestes*, have survived into the present day. Save these exceptions, they have everywhere yielded up the field to their descendants, the placentals, which are better armed for the battle of life.

The reverse is the case in Australia. Here indigenous placentals are neither to be found alive in the Present, nor have any existed there during the Past. The living and the fossil Australian mammal fauna shows us only Monotremata and marsupials. From this circumstance we may draw the conclusion that ever since placentals arose out of marsupial forefathers, Australia was disconnected from the other continents, and thereby precluded from participating in the propagation of the higher placental mammals.

Neither did the small Australian continent with its uniform characters furnish those conditions which led to a metamorphosis of marsupials into placentals in the other parts of the world. In Australia marsupials were allowed to thrive unhindered, to regard the bush forests, the river-banks, the rocks and mountains, the grassy pastures as their undisputed domain, adapting themselves more and more to the character of their surroundings. Some feed on the grass

of the bush, like kangaroos and wallabies, others dig for roots and bulbs like the kangaroo-rats, still others seek their food on eucalyptus trees, like *Phascolarctus*, the Australian opossum, and the flying marsupials. Bandicoots (*Peramelidae*), and the shrew-like bush rats and bush mice (*Phascologale*, *Antechinomys*), are mostly insectivorous; the native cat, the Tasmanian devil, and the pouched wolf carnivorous, with teeth strongly reminding us of those of *Placentalia*. As different as their food are the dwellings, the habits, and the modes of locomotion in all these animals. Like jumping-mice, the kangaroos hop over the level country, some of them, for instance the rock-wallabies, being able to execute their leaps also in mountainous country with the cleverness of a chamois, while the tree-kangaroo (*Dendrolagus*) performs real climbing antics in the crowns of the highest trees. We see the Australian opossum and the *Cuscus* climb with the agility of squirrels; *Petaurus* flits from tree to tree, and is therefore erroneously called by the Australians "flying-squirrel"; *Phascolarctus*, however, climbs along as lazily as any sloth. Slinking is the gait of the native cat, and trotting that of the pouched wolf. In the grass, in rocky caves, on the ground, or on trees, we find the hiding-places and lairs of the marsupials. Like rabbits, the wombats dig long and deep burrows in the ground, and quite subterranean are the life and habits of the blind *Notoryctes typhlops*, which latter has but recently been discovered in the deepest interior of Australia, and the mien and habits of which strongly remind us of our mole; and still all these animals have nothing to do with moles, squirrels, flying-squirrels, rats, jumping-mice, shrew-mice, cats, and wolves. All of them are marsupials, and related much more closely to each other than to any of the placental mammals, which they resemble as to looks, movements, or habits, and from which they derive their popular names. Further, we must not imagine that the placental beasts of prey have sprung from similar marsupial beasts of prey, the genuine jumping-mice from kangaroos, moles from *Notoryctes*, and so on. It is more probable that the transition from marsupials into placentals has taken place only once, and from a less specialised group of marsupials than now exists.¹ The original group of placentals which arose thence has subsequently differentiated into distinct series, like insectivora, rodents, hoofed animals, beasts of prey, lemurs, apes, and men. The outer resemblance between certain groups of marsupials and placentals is a phenomenon of convergence, and is produced by

¹ While I was in the South, Mr. J. C. Hill of the Sydney University made the important discovery, most significant in this association, that one of the bandicoots forms a placenta of the type characteristic of the *Placentalia*.

adaptation to similar conditions of life. It ought to be judged like the resemblance between wood-lice and centipedes, fishes and whales, birds and bats. Outer resemblance is not always a proof of blood relationship. Echidna, porcupine, and hedgehog are nowise related, much as they resemble each other, since the former is related to *Ornithorhynchus*, the second to the chinchilla, the latter to the mole.

Being frequently obliged to shift camp during this time, and having to follow my terriers on their zigzag searches with my horse, I had often some difficulty in finding my way back, and tried hard to impress the course I had taken on my memory. Later I devised a simpler method. On riding my horse Shamyl I had but to loosen its bridle and to leave everything else to my beast. He was sure to walk straight back to our camp of the time being, where he knew his comrades to be. On these occasions he never followed the turns and roundabout ways we had taken, but advanced in a straight line, only avoiding obstacles in his path like scrubs or precipices. This feat he also executed in surroundings where he had never before been, and that immediately after our settlement in a new camp. Already, the year before, I had noticed that this horse, on returning from prolonged rides of several days through regions hitherto unknown to us, used, although still several miles distant, to make straight up to our tents, and that he hit the direction much more unerringly than I could have done myself. On trying to draw a conclusion from my own often repeated experiences in this matter, I feel no doubt but that the horse scented the place from a great distance. Had it been led by sight and memory alone, the animal would at first have tried to get back by the way we had taken, even if it was a circuitous one, and only gradually would its facility in finding the new camp have increased. There can be no doubt that, beside its scent, the horse possessed an excellent sense of locality. This, however, is a faculty altogether different from that above described.

Local memory is, in fact, a quality arising from several factors, and owing its existence to quite various powers of the senses and intellect. Among the senses that of sight stands in the *first* line. The regaining of a place by scent, as executed by a dog on its own or its master's track, cannot really be termed local memory, while the latter, in the strictest sense of the word, shows different grades and variations. The recognising of a certain route once taken stands on a much lower level than the finding one's way by following mountain ranges and water-courses, and observing the character of the vegetation, and the feat thus performed of reaching any point

one chooses from any other point from which one has set out. To accomplish this a man has to survey an extensive range of country, and to attain it he will have to find some elevated standpoint. A little dog will be more at a loss in this respect than a horse or a man, while, on the other hand, the latter cannot cope with any bird, be it the eagle or the carrier-pigeon, which from their lofty height, and endowed as they are with a wonderful eyesight, are able to grasp the broader features, as well as the smallest detail of the country, at great distances, and impress them on their mind. Thus we can explain to ourselves in a very natural way the local memory of birds, which verges upon the miraculous.

Similar are the elements of the native's topographic faculties (or *Ortssinn*, a German word for which it is hard to find a good substitute in another language). Old Jimmy in this matter was a type that cannot be surpassed all the world round. In the densest scrubs, even such as he had never before entered, he found his way with absolute certainty without any doubt or error. He was, however, intimately acquainted with the *facies* of the country, the course of the rivers, and the direction of the mountains, and instinctively observed all the big and small objects in his surroundings, at every turn he took, and the distances he cleared. I often had my fun with the old chap, and said to him one day, "Out here in the bush, Jimmy, you find yourself all right, but this is nothing to *my* country! There we have as many houses in some places as we have trees out here, thousands and thousands, and all look alike. They stand close to each other, and have narrow ways between, which run along amidst the houses in all directions. Then we will see whether you will find your way or whether you will go astray." His answer was very characteristic and instructive. He said, "In such a town me not go far away at once. Me go a bit, and then me come back. Me go a bit to the other side, and come back once more. Soon me know how all the ways run, and then me can go far. Me not get lost." We see that the exceptional local faculty with which this "brick" of a black was endowed was based on nothing essentially different from our own comparatively weak ability to find our way in unknown parts. This faculty is nothing either quite peculiar or mysterious, still less a sort of sixth sense. As his answer denotes, Jimmy knew very well that he too would at first be helpless in quite a strange country or an unknown town. But his power of observation and his memory for places was infinitely superior to that of civilised men, in whom these mental faculties are not only less practised, but are even suppressed and degenerated in favour of others.

On one of my voyages I made the acquaintance of a marine engineer, who very much boasted of his topographical powers, and maintained that he would be able, after having been led about cross-ways and in all directions through a big town hitherto unknown to him, at any moment to return straight to his starting-point. He, however, never had an occasion to prove his powers, which, I am absolutely sure, existed solely in his own vain imagination. It is very easy to boast of such things on board ship, where the static sense is not tried by any harder task than the situation of the dining-saloon or smoking-room. Old Jimmy was both more clever and more modest.

We had glorious nights in the bush at that time. The full disk of the moon stood almost vertically above our heads, and poured her silver radiance over heights and depths, over the banks of the quiet rivers, the rounded granite boulders strewn about at random, over the high and graceful shapes of the eucalyptus trees, and the sombre and densely crowded tree population of the scrubs. A moonlit night in the tropics offers a magical sight indeed. No one can remain insensible to the power of this impression, not even those who feel disappointed by the tropical landscape in general, and who prefer the green and gaily coloured woods of Middle Europe to the dark evergreen primeval forests of the tropics and the palm-tree groves of India. In Middle Europe the moon, during the summer months, stands particularly low in the heavens, and remains but a short time visible. And still this is the very season when the balmy night air suffers us to stay out-of-doors to enjoy nocturnal scenery. In the tropics she stands nearly all night in the zenith just above us. Her light then beams with redoubled radiance, and as we do not perceive the source of all this glory, when we hold our heads in the erect position, we feel like wandering through fairyland. The towering gum-trees stand white and shining as if decked with silver, and almost without casting any shadow. Every line, every leaf, shows distinctly, still the penetrating clearness of day is wanting, and a mysterious veil lies over the shimmering landscape. Were I a poet, I would try to depict the impression of this sight in the human mind. Being a naturalist, I feel the desire to analyse, and thus I ask myself: What is the reason of this wonderful effect, this magic and mysterious element in the moonlight landscape, which makes it an object of folklore and poet's fancy, which peoples it with the dainty shapes of fairies and spirits, and makes it the scene of a "Midsummer Night's Dream," as conceived by one great and many lesser minds? The answer to this question is near at hand. The

effect of moonshine owes its peculiar character to the circumstance of its giving light enough on clear nights to illuminate a surface directly exposed to its rays. Thus, for instance, an open book will be lighted up clearly enough to allow of your reading it. On the other hand, however, it is not powerful enough to call forth a perceptible brightness when diffused, *i.e. indirectly reflected* by the sky or the ground. To this diffuse light we owe, however, the possibility of recognising in daytime those parts of objects not directly exposed to the sun, or even those that are situated in the deepest shade. The blackness of the shadows in the height of daytime is only a seeming one, brought about by contrast, a quantity of diffuse light spreading even within this shadow and causing the all-pervading clearness of day. The contrary is the case with moonlight. Here the diffuse reflected light is so weak as to leave those parts of an object which are not directly exposed to the rays, in darkness, and make their details disappear to our sight. The chief characteristic of moonlight thus consists less in the difference of its hue from that of the sun—though this, too, strikes us in a peculiar way—than in the absence of diffuse light and the almost absolute blackness of the shadows. In the foliage of a tree, for instance, we see the groups exposed to the moonbeams very sharply and distinctly, while the parts remote from the light are wrapt in utter darkness. Used since our childhood to the effects of daylight, moonlight appears to us weird and mysterious, particularly when, as is the case in the tropics, the source of light remains unseen unless we throw back our head.

These very reasons make it difficult to take good shots by moonlight, because the object can be distinctly perceived only if it be situated in the direction of the moon and shone upon by the latter. Our nocturnal hunts were generally in honour of the opossums, which performed antics at night in the branches of the eucalyptus trees. During the day these animals sleep in the hollows or knot-holes of trees. After sunset they awake and climb up and down the trunks with the cleverness of squirrels, though not with the same rapidity, and jump about among the branches. Their food consists, besides the insects, eggs, or young birds they occasionally alight upon, of the green parts of the eucalyptus, which gives their flesh a queer and pungent taste, so that it is only eaten in cases of need. In Coonambula opossums made themselves unwelcome by visiting the vines in the garden, and devouring the small and unripe wine-berries with a ravenous appetite, while later on they did not take any notice of the big and ripe grapes. During one moonlit night we killed twelve in the garden. Their fur is handsome, dense, and light at once, and

a warm fur-cloak, which I have had made out of eighty skins, reminds me still nowadays of my nocturnal shooting, and of the moonlight nights near Tim Shey's Creek. The method of shooting this game was very simple. On my advancing towards a tree on which an opossum was frolicking it would not try to escape, but used to crouch down as quietly as a mouse on one of the branches. Having discovered the game, I arranged my position so as to have my object between myself and the disc of the moon. Then I was certain

Australian Opossum (so-called) *Trichosurus vulpecula*.

of a good shot, as the game and the sight of my gun were equally shone upon by the moon. On the Burnett two kinds of opossums (or "Gruna," their native name) are found; the rather frequent *Trichosurus vulpecula*, var. *typicus*, and the rarer *Pseudochirus peregrinus*, the ring-tailed opossum. A near relation of these so-called opossums is the flying squirrel, *Petaurus* ("Uāā" of the blacks), represented on the Burnett by various kinds. They too were common near Tim Shey's Creek, particularly the stately *Petaurus sciureus* and the small graceful *Petaurus breviceps*, var. *typicus*. With the greatest agility they climb up the trunk of the eucalyptus trees to the very tops. Then they spread out a fold of skin, which connects their limbs and tail and serves as a parachute, and

noiselessly, in gentle flight, float downward towards the foot of a distant tree, the top of which they immediately ascend. Thus I sometimes saw them float through distances of fifty yards, never failing their goal, and even managing to change their direction in the midst of their downward sweep, and to settle on another tree than that they had first chosen. It was far more difficult to

Flying-Squirrel (*Petaurus breviceps*, var. *typicus*)—half natural size.

shoot these animals by moonlight than the 'possums. Mostly I obtained them alive through my blacks, who could find the fresh traces of their climbing on the trees they inhabited, and fetch them out of the knot-holes in which they rested throughout the day. The captured animals proved excessively wild, fierce, and quarrelsome—real little devils. Most of the females had already young in their pouch at that time, generally one, sometimes two. With *Trichosurus* I never found more than one offspring.

During the night we were at that time much disturbed by the

dingos, which ventured quite near to our tents, our dog Topsy being salacious and consequently exercising a strong attraction on them. Her friend Jack felt very much aggravated by these attentions, and vented his feelings by barking for hours together. Between tame dogs and dingos we find the same antagonism as between dogs and foxes. The power of love, however, triumphing here, as so often, over the animosity of tribe, the offspring of the hostile family will in such a case boldly brave any danger to enter the camp of the enemy wrapt in the mantle of night. Despite of blinding passion, those daring suitors were still cautious enough to avoid my shot whenever I tried to surprise them with my gun. On the whole, I succeeded very rarely in shooting the cautious and sly dingo, frequent as it was in those parts. The squatters kill many of them by strewing morsels of meat poisoned with strychnine along the roads and tracks, which are used not only by men but also by the dingos on their nocturnal rambles. In the neighbourhood of the stations one often finds their rotting corpses, and has to pay attention to one's own dogs, lest they take up the poisoned bait destined for their wilder relatives, those dangerous enemies of herds of sheep and straying calves.

The dingo is an originally domestic dog gradually grown savage, no genuine "wild dog," and must, therefore, not be reckoned among the indigenous Australian animals. As has already been mentioned, it was probably introduced by the blacks on their immigration into Australia, and we have seen that certain larger carnivorous marsupials, with which it entered into competition, have been driven back and consequently supplanted by it, so as to have entirely died out on the Australian continent.

Strictly speaking, Australia does not possess a single indigenous mammal, beside monotremes and marsupials. Some genuine Australian placental mice and rats form no exception to this rule. These rodents are expert swimmers, are subject to introduction in an indirect manner, and are prolific, as are the bats, which have also entered Australia and New Zealand. The same may be said of seals and marine mammals.

During the first half of August we had numerous violent showers, which caused the grass to thrive abundantly. We were much pleased at this, as our horses thus enjoyed a better pasture. My blacks, however, did not like this change at all; it increased the difficulty of detecting and avoiding the snakes in this region, so full of these venomous reptiles. Johnny told me, in great excitement, how he had nearly stepped upon a "Wonge," when luckily he

perceived it in the very nick of time. The blacks, who walk about noiselessly and with bare feet, are much more in danger than the well-shod whites, and only their falcon eye prevents them from being bitten more frequently. Thus at night they are very averse to outdoor exercise, partly from superstition, partly from fear of snakes.

All snakes have a great faculty for hearing. As soon as the sounds of man's steps touch their ear, even the venomous snakes will instantly fly to some convenient hiding-place. Thus it is that a white person, living in a country abounding in snakes, may, nevertheless, rarely encounter any, and therefore underrate their frequency and danger. Blacks are more circumspect in these matters. The

Death-adder (*Acanthophis antarcticus*).

most dangerous snakes are not the agile and lively, but the lazy and torpid ones, which do not retire on the approach of man but remain motionless, and viciously attack any person who chances to touch or tread on them. Hence it is that, in Australia, the less-venomous death-adder (*Acanthophis antarcticus*), a clumsy stout creature, is more dreaded than the very poisonous black snake (*Pseudechis porphyriacus*) or the brown snakes (*Diemenia superciliosa* and *D. olivacea*), or even the deadly *Hoplocephalus*. Its very torpid character and want of caution and timidity makes it the terrible enemy it is. Queensland is very rich in snakes, particularly in venomous ones, two-thirds of the species inhabiting the country being of this order. All of them belong to the Proteroglyphous serpents, the poison-fangs of which are situated in the front end of their upper jaw. Although the weapon of these snakes thus represents an instrument of murder, less perfect than that of most vipers, still some representatives of Proteroglypha, as for instance, the

Egyptian spectacle-snake, the Indian cobra and the giant hooded-snake can rival the most terrible vipers, rattle-snakes, lancet-snakes, and puff-adders.

Black Snake (*Pseudechis porphyriacus*).

Brown Snake (*Diemenia olivacea*).

Not one of the Australian kinds is as venomous as the cobra. Nevertheless, a great many persons, particularly children, fall a victim to snake-bites, or at least suffer lasting damage to their

health. During the cooler season, which lasts about two months in Middle and South Queensland, and is somewhat longer in the more southern colonies, one rarely hears or reads anything about snake-bites. In these periods the animals keep hidden the greater part of the day and only appear at noon, if at all, to bask in the sun or on some warm slope. Already in August, however, the snakes begin to revive, and you need but take up a Sydney newspaper, or the Brisbane *Courier*, to find several records of snake-bite in the course of every week.

So far as I know, Australia does not yet possess any statistics about the frequency of snake-bites and their causing death or lasting injury to health. I have calculated that the Brisbane newspapers record about fifty to one hundred cases a year, principally from southern Queensland, without, however, mentioning all that occur in those quarters. The number of cases registered by the papers of Sydney, Melbourne, and Adelaide are very similar. It is decidedly no exaggeration to say that 500 persons are yearly bitten on the Australian continent, although the majority of these cases do not prove fatal. The population of Australia is at present supposed to amount to 3,000,000. About 20,000 deaths by snake-bite are yearly reported from the British provinces of India, containing 120,000,000 inhabitants. This record may indeed be somewhat exaggerated, and may owe its enormity to conscious or unconscious deception of the magistrates by the native officials. Decidedly, however, the figures are not so much overrated as is frequently believed. In India, as well as in Australia, in the course of a year about one person in 6000 falls a victim to snake-bite. The less fatal character of the Australian cases is due to the lesser virulence of the snakes of this continent, as compared with the cobras and "Bungarums" of India.

One must not, however, suppose that people in those countries live in continual fear of their poisonous neighbours. In fact, they do not think of them when walking or riding, and only exercise caution when occupied in places where quantities of dry wood or faggots have accumulated, serpents having a predilection for such hiding-places. Once, on my being about to thrust my hand into a bird's nest, in a hole of the river-bank, to see whether it harboured any young birds, Frank anxiously laid hold of my arm and began to examine the hole with his stick. Such excavations form a favourite resort of snakes, and children, generally far more passionate naturalists than grown-up people, are very often bitten on similar occasions. My little friends in Coonambula were keen

sportsmen, and always on the look-out for insects and reptiles, and I owe to them many a fine specimen in my collections.

The most ardent among them was little Percy, who knew how to catch scorpions, poisonous centipedes, and spiders better than myself, and who used without flinching to touch and to kill any snake. After my departure from Australia he once got bitten by a poisonous serpent, and was ill for some time. It, however, did not do him any lasting harm. His mother was, of course, not very partial to these collecting propensities of her children, which, nurtured by my presence, extended to harmless and poisonous animals alike. Above all was she anxious, on account of the snakes which ventured into the garden and the immediate neighbourhood of the house, sometimes even into its very interior. Once a large and excessively fierce "black snake" was found and killed in the fireplace of Mr. M'Cord's office. Another *Pseudechis* got away and hid under the timbers forming the foundation of the house.

The best checks to the entry of serpents within the precincts of human habitations are cats, who know how to kill them by their paws without getting bit. They do this out of mere playfulness, for never will you see them eat of a snake they have killed. Similar is their treatment of lizards, which they also like to catch but will never devour. Some dogs will also attack and kill any snake with courage and caution. Some time or other, however, they are sure to get bitten in the nose or mouth, and regularly succumb to the wound. During my stay on the Burnett, two good dogs of my blacks were killed in this way. My fox-terrier Topsy, the pet of our camp, which I intended to take with me to Java, the Moluccas, and Europe, but which I finally left behind me in Queensland, was, shortly after my departure, bitten by a big snake, which with inborn pluck she had attacked and vanquished.

Injections of strychnine or solution of ammonia, the latter infused straight into the vein, are used as a remedy, but opinions as to the efficiency of these antidotes are as yet divided.

Every night, before I went to rest, I used attentively to examine my blankets, serpents being very fond of retreating into soft hiding-places of this sort. The idea of having such a sleeping-companion is apt to make a person uncomfortable, even though he may not usually be considered timid. After Johnny had one evening shown me a most unaimable-looking *Diemenia olivacea*, which had crawled into the folds of his blanket, and I thereupon made part of my collection, I took care never to lie down without a thorough investigation of my couch.

Most of the poisonous serpents my blacks brought to me were of no use for my collections, the natives being so much afraid of them that they are not content with simply killing them, but crush their heads till they are perfectly smashed and disfigured. They have, however, not the slightest fear of the powerful giant snakes, as, for instance, the carpet-snake of the colonists, *Python (Morelia) spilotes*,

Carpet-snake (*Python spilotes*).

which they call "Bui," and the white eel-like flesh of which is considered by them as a great delicacy. Like all giant snakes, the Australian python is not poisonous. Its food consists of smaller marsupials, water-rats (*Hydromys*), and birds. Its habits are chiefly nocturnal. Sometimes, however, you will see it bask in the sun on stony declivities, when it is easy to approach, much easier than its poisonous relatives, which the blacks steal upon cautiously and with noiseless steps as if stalking. Thus Johnny one day led me to a hillside where, as he had noticed on the preceding day, a black snake basked. In spite of our approaching stealthily on tip-toe,

the venomous creature had perceived our coming and had hid itself in a safe retreat. In its place we found a coiled-up carpet-snake, which was so lazy and indifferent that we had to touch and even poke it with our stick, ere it made up its mind to uncoil and slowly crawl away. I killed it and some others later on, curing their skins and the scales covering them. They made elaborately figured leather strips, which I turned into a number of girdles, cartridge-belts, bags, card-cases, and note-books after my return to Europe.

Great is the number of gigantic lizards to be found at every step. The weird-shaped "frilled lizards," Binangaram (*Chlamydosaurus Kingi*), tree-animals which, when attacked, hotly defend themselves with their sharp teeth, using their mighty erectible collar rather to inspire fright than as a shield; the yard-long "Guana" of the colonists; "Jimben" of the blacks, kinds of Varanuz, which, when startled, climb up the trunks of the blue gums with funny haste; the water-'guanas (*Physignathus Lesueurii*) are expert swimmers, and like to perch in the branches of the tea-trees and on the tree stumps of the riverside, whence they let themselves drop into the water with a big splash if any one is approaching; finally, the lazy and torpid "sleeping lizards" (*Tiliqua scincoides*).

Wherever he turns, the naturalist will encounter strange animal forms; but not only do the species differ from those we know in Europe, but also the genera and families. This circumstance, which is most pronounced respecting mammals, also obtains, though less conspicuously, in the case of birds, reptiles, amphibians, and fishes, and even in the invertebrates of Australia. The animal world of Australia shows a most surprising difference from that of the rest of the globe, from which fact we may deduce the conclusion that Australia has been out of connection with the other continents for a vast number of years. No other continent has been so isolated since the beginning of the Tertiary Period. The continents of the old world stand in direct connection up to this day, and Africa was formerly quite closely bound to Europe, the Mediterranean having sunk between the two like a ditch not very long ago—relatively speaking. This may be stated conclusively from the zoological character of its northern and southern shores. Also it may be proved that North America has been connected with the northern parts of the old world once at least during the later Tertiary Periods. This passing connection was preceded by a sharp division which endured from the Cretaceous Period into the Miocene.

Without laying much weight on the systematic collection of

species, I still managed to gather a good number of land-vertebrates, fishes, and invertebrates, amongst which there were several new forms. I, however, refrain from a detailed account of these, only wishing to give a general impression of Australian animal life in this book, while the purely scientific results of my travels are being published in another place.

Twice I was obliged to shift my camp, in spite of its being most favourably situated, on account of my blacks refusing to search for *Echidna* in a place so haunted by snakes. In general, however, my men worked quite to my satisfaction. My collection of *Echidna* embryos kept steadily growing, and marsupial embryos and young were amply gathered by myself.

These scrubs round Tim Shey's Creek were particularly dense and might have been called beautiful, if this term may be applied to a landscape, the chief characteristics of which are severity and gloom. The lighter scrubs look charming at times, when decked in a garment of bright flowers, and when the common "wattle" (*Acacia aulocarpa*) is in bloom, its yellow blossoms offer a very pretty and original sight. Flowers and bright-coloured bushes and trees are, however, only to be found on the margin of the thickets, or here and there in open glades. Within the scrubs one will look in vain for any bright colour, a sombre green reigning everywhere. The ground between the trees is almost bare of vegetation, strewn only with fallen trunks, dead branches, and fragments of plants. Here the "scrub-turkey" (*Catheturus* [*Talegallus*] *Lathamii*) builds its nest by scraping together with its powerful claws great quantities of vegetable substance, mould, grass, leaves, branches, and mushrooms, out of which it builds an enormous mound of a flattish shape. The diameter of these mounds varies from 4 to 5 yards at their base, their height from $1\frac{1}{2}$ to 2 yards, so that the material they represent would make up several cart-loads. It is undecided as yet whether one pair or a whole party of birds combine to construct these mighty nests. The circumstance of one's occasionally finding more than thirty eggs buried in one mound leads me to suppose the latter. The eggs are laid into these hills at a depth of one or of half a yard, and are incubated by the warmth arising from fermentation of the rotting vegetable substances. The parent birds do not abandon their brood entirely during this process, but appear once or several times during the day to air their eggs. They examine whether the places they occupy have an appropriate temperature, or whether this has grown either too hot or too cool, and they help the chickens ready to slip out in freeing themselves from the depths of this hatch-

ing oven. In these scrubs I was able to note the interesting fact that the birds began to build their mounds already in August, while the laying of eggs takes place only about Christmas time. Gould, to whom we owe the first detailed accounts of the brooding habits of mound-building scrub-turkeys, has declared that the construction of the nest begins but a few weeks before the laying of eggs. The fact that the hills are so extensive, and the decay of material in the lower parts of the nest is already so far advanced

Australian Bower Bird (*Chlamydodera maculata*)—about one-third natural size.

when the laying of the eggs commences, has led to the conclusion that the same mound is employed several years successively, being fitted up every time by the addition of new material. As to my own observations, the birds scrape together a new heap every year, as a rule, if not always. They, however, begin this work not several weeks but four or five months before laying the eggs, a provision which is very much to the purpose. For mighty erections of this sort, the material for which has to be carefully so gathered and chosen that the right temperature may develop in their interior, cannot be raised at a moment's bidding. Plausible as this appears to ourselves, we must admire the wonderful instinct prompting the animals to make such preparations for eggs to be laid more than

three months later. Still more interesting is the instinct shown us by the celebrated Australian bower-bird (*Chlamydodera maculata*), another inhabitant of these scrubs. Though closely related to the bird of paradise it is insignificant in plumage, its colouring a dark brown with buff spots on its upper, gray intermingled with yellow on its lower side. Only the neck is adorned with a band of elongated feathers of a beautiful satiny rose-pink colour, contrasting vividly with the dull browns of the rest of its plumage. Its size approaches that of our jay. This bird has real romantic and aesthetic tendencies. Like other birds, it builds its nest of twigs in the foliage of the gum trees and tea-trees, lines it with grass and feathers, and there hatches its eggs and rears its little ones. But the male is not content to court his little mate in trivial or indifferent surroundings. A thrilling song, brilliant attire in which to parade before his bride-elect and enthrall her senses have been denied him. Chivalrous tournaments, ending in the beauty's according her favour to the valiant victor, are not to his taste, he being more disposed to the arts of peace. Benevolent nature, however, having withheld from him the gifts of courage, brilliancy, and song, has endowed him with superior talents for architecture and decoration. In lonely parts of the scrub he builds bowers about 3 feet in length, outwardly consisting of twigs, intertwined and lined with tall grasses. The side-walls slant towards the top, so as to form a sort of cupola or ridge where they meet in the middle. The floor of the avenue-like bower is very daintily inlaid with small stones, mostly roundish river-pebbles, which are quite artificially arranged. A row of stones diverges from the mouth of the bower on each side, whilst a collection of little treasures and decorative material forms two heaps, one before each entrance. I found that they consisted of bivalve shells, blanched crania of small Mammals, particularly of bats, small bones of every sort, little coloured rags and scraps, stolen from some camp or settlement, feathers, and green or red berries.

Such is the love-haunt of the bower-bird, here the little female receives the visits of her wooers, here she watches their games, frolics, and dances in her honour, in this stateroom she deigns to incline her coy mind to the wooings of the chosen one.

When the male nightingale sends forth its sweet and thrilling melody, the finch breaks out into merry notes, when the peacock, the black-cock, or the bird of paradise spreads out the splendour of its plumage, all this is done to please the other sex, and every ingenuous lover and watcher of birds will remark that the female is

pleased and touched by the sweet sounds, the brilliant colour and charming design produced or exhibited in her honour.

Nevertheless, all the lively and brilliant colouring to be found in animals is not associated with selection of the most handsome partner, a principle termed by Darwin "Sexual Selection." In lower-organised animals the spiritual life is much too rudely developed to enable us to speak of a real "selection" in the pairing of the sexes. Here the lively colour and striking design serve for the mutual recognition of the members of one species, or to inspire terror by proclaiming the unsavouriness or venomous character of the animal to the persecutor at a distance. It must be admitted that Darwin went too far here and there in tracing the great majority of cases of striking colour or design in animals to the predilection of the female for the same, and to the sexual selection practised by her. Wallace, Darwin's great ally, has won considerable merit by sifting the material, and by discarding and differently explaining cases which could not well be traced to sexual selection. Not every bright colour ought to be seen in the light of an ornament. Often the difference of hue in the sexes is explainable by the fact that the breeding female is in need of protection in the way of a simple unobtrusive garment, whereas the male can forego this. Thus far I accept Wallace's criticism. Where, however, he tries still further to limit the efficiency of sexual selection, hardly even admitting it in the case of birds and butterflies, and going so far as to doubt of its being productive of the peculiar ornaments the males wear as a nuptial dress, there, indeed, he seems to me far to exceed the mark. He sees the main reason for the development of the fantastic tufts, the accessory feathers, the elongated tails, the splendid colours of the wedding attire in the heightened vitality and strength pervading the body at this period and intensifying metabolic change and energy of growth in all the tissues. The display of plumage, the erection and spreading out of the accessory feathers and tail, are, in his opinion, also indirectly occasioned by nervous excitement which is at its climax during the time of propagation, and he further believes them to act on the senses of the female less by their mere beauty than by the manly maturity and vitality they express.

This alone would, however, not justify so gorgeous an outlay as the wedding suit of a bird of paradise or an African widow-bird, garments which, in fact, endanger their bearer by rendering him not only conspicuous but awkward and clumsy. I myself, when staying in Tropical Africa, have watched male

individuals of *Vidua paradisea* in their wedding dress, and found them so much encumbered by their enormously prolonged tail-feathers that they had difficulty in flying when the slightest wind was blowing, and that when doing so they were hardly able to control their movements. If an ornament carries with it such disadvantages, it is sure to compensate for them by a real intrinsic value, else it would have been exterminated or even suppressed its origin by natural selection. I cannot possibly regard it, like Wallace, as the mere appendage of the heightened energies of maturity. Various facts tell against this supposition, and above all that of its decidedly endangering the bearer, whereas it ought to compensate it by a far greater service rendered. The behaviour of both sexes during the time of propagation clearly shows us that this service consists in the impression a thus decorated male produces on his chosen one, and in the advantage he enjoys over less-ornamented and therefore less-attractive wooers. It has even been frequently remarked that male birds, robbed of their wedding adornments, have been rejected by the other sex.

Wallace does not go so far as to deny the alluring impression the male bird produces on the female by unfolding his gorgeous plumes, but he traces this impression to her delight in his manly vigour and maturity, not to an aesthetic appreciation of his charms, having, as he believes, no reason for imputing to the female bird any of those aesthetic emotions, which are excited in us by the beauty of form, colour, and pattern of these plumes. To this I answer: we have indeed every reason to believe in, and even a striking example of the existence of aesthetic tendencies in birds, and of their pure delight in graceful form and bright colour, when we watch the above-mentioned bower-birds build their elaborate bowers for mere aesthetic pleasure, collecting together the material for their decoration from far and wide. In this instance we see the shape and colouring produce delight in itself, and that not merely as an expression before the female of manly vigour and ripeness.

The bower-birds on the Burnett were by far not so shy as they are commonly supposed to be. They paid frequent visits to the garden of Coonambula, where I shot no fewer than three of them.

Less interesting by its curious habits than by the excellency of its tender white flesh, is another inhabitant of the dense scrubs, the fine and handsome Wonga pigeon, *Leucosarcia picata*, called by the natives of New South Wales "Wonga-Wonga," in imitation of its peculiar call, "Wung" by those of the Burnett. It is chiefly seen moving about the ground, but flies up instantly on hearing

any one approach, being then very difficult to shoot on account of its detecting one's presence ere one has come within reach. It mostly does not fly far away, but settles on a tree at about one hundred yards distance. Thence the same play begins again, the cautious bird making a fool of the eager huntsman for hours together, unless he lose his patience.

We were now in the middle of August, and my collections of *Echidna* development progressed rather well. Dahlke, meanwhile, had been persevering in his searches for *Ceratodus* spawn from the main camp on the Boyne, which he had arranged very comfortably and much to the purpose. The poor fellow was all the time much persecuted by pain, supposed by him to be rheumatic, radiating from the pelvis and spreading over his entire body and legs. The work in the water seemed therefore ill-adapted for his state of health, so that I proposed to change places with him. Whilst I returned with Haupt to the camp on the Boyne, there to direct my endeavours to the collection of *Ceratodus*, Dahlke was to stay in the mountains with Wein and the blacks, to preserve the *Echidna* material procured by the latter. I was able to leave this task to him, having taught him during our common life how to open the animals correctly, how to find the eggs and embryos in the uterus, and also how to preserve them. For the latter part of his task I gave him detailed written instructions. I must own that this change of places was not very much to my taste, the time for *Ceratodus* having not yet arrived, while the harvest of *Echidna* embryos was at its richest.

CHAPTER IX

IN THE MAIN CAMP ON THE BOYNE

ON 18th August I returned to the camp on the Boyne with Haupt, Dahlke meanwhile repairing to the upper camp in the mountains. He was already very poorly at that time, and had difficulty in mounting his horse and in getting through the long ride. Three days later he had grown so much worse that Andrew Wein and Johnny had to take him back to Gayndah, under the greatest difficulties. His horse had to be led at a walking-pace, while the two men supported him on either side. Thus the journey took considerable time. The root of the evil was not, however, rheumatism, but lay deeper, as I had supposed from the beginning. Two years ago Dahlke, by falling with his horse, had acquired a fracture, or worse still a splitting of the pelvis, suffering many months subsequently in consequence. Finally some fragments of bone were extracted by operation in the Brisbane Hospital, whereon he grew decidedly better. A fistula, however, had remained, and he limped ever since that time. I instantly suspected that his so-called rheumatism was a consequence of this accident, and, sad to say, the further development of the malady proved my fears to be correct. At Gayndah it was stated that further exfoliations of the pelvis had taken place. After some months of acute suffering he grew better, soon, however, a relapse set in, and six months later the strong and healthy young man fell a victim to the consequences of his old accident. I shall ever think of him with deep gratitude, he, during our common work, having always furthered my interests with an unrivalled energy and circumspection, just as if they had been his own. He quite identified himself with my pursuits. When hindered by illness or suffering pain, as was often the case, he suppressed his ailments by an admirable power of the will, so that I had great trouble in inducing him to take care of himself. To this virtue

he added perfect sobriety, honesty, and real German diligence. I had had the luck to find, out here in the distant bush, a companion I could rely on as on myself, whose memory I shall honour and cherish as long as I live.

After Dahlke's departure, Andrew Wein undertook in his place to camp in the mountains with the blacks, to receive the Echidnas brought by them, to open the animals, and to preserve their eggs and young. We of the main camp, in the meanwhile, applied ourselves to our aquatic business, rowing about on the extensive waterhole in our Kurrajong boat, gathering the water-weeds, richly growing everywhere, with a long rake, and minutely examining them stem by stem in our search for *Ceratodus* spawn. The weather was perfectly clear and very dry. To the regular inhabitants of the river, which had their nests on its banks and used to enliven the scene, to these ducks, geese, kingfishers, and numerous water-hens were now added a number of visitors, the arrival of which had, according to the opinion of my men, to be attributed to the setting-in of a drought in the district they had till now been inhabiting. The Australian pelican (*Pelecanus conspicillatus*) was to be seen everywhere. Once a party of ten of these queer animals settled down on our waterhole, staying there for more than a week. They were not shy in the least, and so easy to kill that to shoot them seemed to me a sort of murder, wherefore I left the powerful birds in peace, after having killed three of them. Nearly as numerous was the black Australian swan, *Cygnus atratus*. This I persecuted with greater zeal, having found that the breast, after the removal of its long black feathers, furnishes a splendid snowy-white and downy fur. Nothing better in its way can be imagined than a lady's muff made of the snowy-white down of this bird. At the same time, we observed the appearance of a species of ibis, *Carphibis spinicollis*, which arrived by the flock, occupying the river-banks, swamps, and lagoons, as well as the open bush. They used to settle on the railings and fences of Coonambula, and to fly at a moderate height above our heads in dense numbers.

During our aquatic searchings we found many a rare or new form of freshwater sponge, crayfish, snail, and shellfish. I will, however, spare my reader an account of all these things. Amphibians were rather rare in these surroundings. I collected four species of frogs, one species of toad, five species of tree-frogs. Tailed batrachians, such as our salamanders, newts, the Japanese giant salamander, the Mexican axolotl, were, however, nowhere

to be found. They are missing in the entire Australian region, in tropical and southern Africa, in temperate South America, in short, on the whole southern hemisphere, with the exception of some examples I am going to mention. This distribution is very curious if one considers that the Stegocephali, which have existed from the Carboniferous into the upper Trias and have to be regarded as the most primitive amphibia, have been found on all the five continents, as well on the southern as on the northern hemisphere. The tailless amphibia, as, for instance, frogs and toads, likewise inhabit the southern hemisphere to the same extent as the northern one. Their richest development is to be found in the tropics of the old and the new world.

On my travels in the African and Asiatic tropics and in the Australian region, I have frequently asked myself what might be the reason of this curious distribution of tailed batrachians on the earth, a thing unparalleled by any other group of animals. I believe I have found the cause in the great susceptibility of tailed amphibians to high temperatures. All of them prefer a moderate freshness combined with moisture. When, at the height of summer, the temperature of the water they inhabit rises, the newts leave their dwellings, retiring to hiding-places beneath stones or within the cooler ground. If newts, kept in a jug with water where they cannot crawl out, are exposed to the hot sun, half an hour will suffice to kill the whole lot, whilst frogs will feel quite at their ease under the same conditions. Wherever you find any tailed amphibians you will observe that they prefer cool haunts, wooded surroundings, and mountain streams which are not too easily heated by the sun. They can bear cold up to freezing-point, scarcity of water up to real aridity. Heat, however, proves decidedly destructive to their constitution.

Geological facts show us to a certainty that tailed amphibians have originated on the northern hemisphere, fossils of their order being absent in South Africa and South America as well as Australia. This proves them not to have been exterminated but never to have existed in these parts of the world. The oldest allies of our modern forms are found in the lower chalk of Belgium, and are succeeded by specimens in the Eocene of France and North America. The study of geology does not give us any very definite information as to the first origin of tailed amphibians, showing us a gap between their structure and that of the primitive Stegocephali. It further proves the latter to have died out during the Trias, and whereas the former, so far as we know, did not originate before the Cretaceous

period, during the Jurassic there seems to have been an interruption in the amphibian series. Future observations and discoveries will certainly clear up this problem. So much, however, is certain, that tailed batrachians, even in a fossil state, are only to be found on the northern hemisphere, that they have originated there and have subsequently spread themselves out over its whole extent. Contrary to the frog-like amphibians of later origin they get scarcer towards the tropic of Cancer and disappear in the tropics with the exception of a few cases. The boundary of the tropical regions has formed an insurpassable limit to their extension. On purpose to reach the temperate climates of the southern hemisphere favourable to their existence, they would have had to break through this, a thing impossible to their nature. Wherever we find that they have really penetrated, their entrance has been achieved along the cool summits of mountain ranges which offered them a passage adapted to their tendency to cool temperatures. Thus we can explain the existence of a species of tailed amphibians—*Amblystoma persimile* in Siam, in the high mountains of Laos, outskirts of Himalaya; thus that of another, *Tylostrotion verrucosus*, in the Chinese province of Junnan, on the south-east descent of the Himalayas. From North America tailed batrachians, progressing along the cool tablelands which form the backbone of Mexico, have penetrated as far as the tropics. The lakes of those plateaus form the home of the well-known Axolotl (*Amblystoma*), an animal of particular biological interest. Beside it we only find in these parts the genus *Spelerpes*, which has penetrated far beyond Mexico into Central America, even into the mountainous regions of Columbia, Ecuador, and Northern Peru, having at its disposal high mountain ranges and cool tablelands all along its passage. Thus we see that the presence of this only genus beyond the equator in this most favourable place, far from contradicting the above argument, confirms it in its very isolation and topographical singularity.

Contrary to the tailed batrachians the tailless batrachians or Anura prefer hot climates, and have their principal home in the tropics. The barrier formed by the tropics is no hindrance to them; they spread freely beyond it to the north and to the south, covering all the zoo-geographical regions and sending forth their kind even into New Zealand, a country generally exceptional with respect to its animal world. Deserts and oceans form the most powerful barrier to their extension, but nevertheless their eggs are sometimes carried by water-fowl to great distances. Cold does not check their

progress any more than heat, for we find representatives of their kind as far as the Polar regions.

The third group of existing amphibians, the Coecilians, are limited to hot climates. They form a strictly tropical order, and do not enter the temperate zones of either the northern or southern hemisphere.

There is no other class of animals the distribution of which so clearly proves that temperature may, but need not necessarily, be a decisive factor in the localisation of animal groups on the face of the earth. Tailless amphibia, little sensible to changes of temperature, can spread everywhere, provided obstacles of other kinds do not stop their progress. *Cold* forms a boundary for Coecilians, forcing them to limit themselves to the tropics; *heat* bars the way to tailed batrachians, keeping them bound to the northern hemisphere. We rarely find the causes of distribution marked out in any class of animals as clearly as in this, temperature playing a merely indirect part and not being of the same vital importance in the case of most animals as in plants. Botany furnishes us with a number of cases parallel to the above, since plants are more directly dependent on temperature than animals.

September had now approached, and with it the probable spawning-time of *Ceratodus*. The rivers were empty and the water-holes filled with a dense growth of water-weeds. It was now time to turn all our attention to our old friend *Ceratodus*, and to concentrate our energy on the attainment of its eggs and young. *Echidnas* having by this time big and fully-developed young ones in their pouches, it was not worth the trouble to pay much attention to them. I therefore broke up the mountain camp altogether and united everything in the main camp. Jimmy, having distinguished himself in catching *Echidna*, received my old horse Shamyl in reward. The person who should bring me the first *Ceratodus* spawn was to have a prize of £5, be he a white man or a native.

During the next days the Boyne was searched with the utmost zeal for the precious objects, above as well as below my camp. Four days passed without result. On the evening of 16th September Mackenzie came towards me with a radiant face, bringing three eggs he had just found. This meant to him a little fortune. During the next days the blacks searched the same place all together, bringing me nearly 700 eggs, amongst which there were indeed many decayed specimens. The eggs are very tender and will not bear being transported in small vessels with little water on a very hot

day. Sound eggs were well paid for, whereas I gave no reward for decayed ones. Thus I accustomed the blacks to take care of what they had found, not to stuff too many eggs into one vessel, to change the water frequently, and to bring me their booty as quickly as possible or to send it by their wives and children.

The two following weeks were wholly spent in the preservation of the eggs brought to me in such quantities. As far as possible I took off their teguments beforehand, but kept a certain number of the eggs alive to observe their development. At the beginning I kept them in big glass vessels, the water of which I frequently changed. Later on, when this method did not prove so efficient, I put them into swimming wooden cases, which I anchored in the river. Of course these were my own handiwork, and, in the hope of hereby doing service to other naturalists who may find themselves in a similar situation, I will explain their very simple construction. I took a common wooden box, removed its opposite sides and replaced them by a fine net of wire-gauze. On the bottom of the box I laid several stones, which were to keep it floating in the water so as to expose only its upper surface to the air. The upper opening is best closed by a lid to prevent the entrance of marauders of any kind. The box is so fastened in the water as to turn one of the sides covered by network to the stream so that the water must perpetually pass through its interior. These breeding-chests did very well. I succeeded in obtaining a complete series of the fish's development, from the first segmentation of the egg to an almost fully developed state, and, what was more, several specimens of each stage.

A few days after the first discovery of the eggs, Mackenzie came to me asking me to dismiss him and to pay him off directly. I told him that in a few weeks all would be over and that whoever would stay with me would be amply paid. But he was not to be dissuaded, eager as he was to receive his £5 and what he had earned besides. I could not do otherwise than yield to his wishes, and as he insisted upon going it was impossible to refuse him his pay. On the next morning nearly all my blacks were drunk, Mackenzie having proudly mounted his steed, paid a visit to amiable Mrs. Corry, inducing her to furnish him the necessaries for a solemn leave-taking banquet to his friends. Of course the sympathetic old lady was not able to withstand the sight of shining coin, and had proffered numerous bottles of her precious liquid for the heightening of the occasion. This time it was a more serious matter than the year before, since a deadly feud existed between Mackenzie and Jimmy,

and the former was known to behave like a wild beast when drunk. A short time before he joined me, he had inflicted a deadly wound on another black with his tomahawk, who, as already mentioned, was killed soon after my departure on a similar occasion. Luckily old Jimmy was reasonable. Neither he nor his people partook of the sweet poison offered them, a wonderful deed of abstinence in a native. On the contrary, the morning after the

night on which the carousal had begun, he came to my camp, which was about six miles distant from that of the blacks. He told me he wanted to keep aloof with his family for fear of bloodshed. Through him I received the first news of what had happened. At noon Johnny brought me some *Ceratodus* spawn, gathered two days before and completely decayed, asking full payment for the same. He was ridiculously intoxicated, and in such a boasting humour that I turned

Mackenzie.

him out of my tent with my own hands. I was pleased to hear that the brandy had been drained to the last drop, and that Mackenzie, with his wife and child, all of them completely drunk, had reeled off to Cooranga, where they had taken service for mustering.

On hearing that, two other blacks, John Bon and Tommy Dodd, wanted to leave me too under immediate payment, I thought it better to have a little private conversation with Mrs. Corry. My arguments were crowned by success and stopped the source of further dissipations for my blacks.

Whilst *Ceratodus* prefers to lay its spawn in deep parts of the river which do not show too rapid a current, where the muddy ground is productive of a dense growth of weeds, another inhabitant of the river is wont to spawn in its flat, sandy, and stony parts, under a rapidly-passing current. In such places at this season I found numerous light-coloured circles of about a yard across. On looking more closely I often noticed a fish swiftly swimming about inside this ring and, as it seemed, occupied with a work of importance. On examining the ring itself, which has a breadth of about eight inches, I found that its light colour is due to the removal of all stones, large and small, from its surface. They

had been carefully carried into the inner circle, so that the surrounding ring shows the gleaming white sand of the river-bed, bare of every pebble. The ring shows no other peculiarity; the inner circle, however, excited my interest. I felt certain of its containing the spawn of the fish *Arius australis*, which is a siluroid called "Jewfish" by the colonists, "Bolla" by the blacks. At the top I found several layers of big stones, amongst which nothing was to be discovered. These are succeeded by a mixture of small pebbles and coarse river-sand, beneath which follows the common river-ground. At first I was unable to find eggs in any of these layers, closely though I examined them. Observation through the rapidly-flowing water is, however, far from easy, and being sure that this was the depository of the eggs, I further investigated the matter. I took out a part of the gravel, cleaned it from sand by passing it through a strainer, and thus found numerous though very tiny eggs. They have a diameter of about one-eighth of an inch, and are surrounded by a closely-fitting tegument.

When depositing its eggs and building its nest, the fish goes to work in the following way. It begins by preparing a bedding about half a yard in area, consisting of gravel and small pebbles, among which it deposits the spawn, which is instantly milted by the male. After this it covers up the eggs by several layers of bigger stones, thereby preventing them from being washed away by the stream or being carried off by water-birds fond of this kind of caviare, or by marauding little fishes. The material for this defensive structure is derived from the above-mentioned ring, which thereby becomes devoid of all stones and gleams brightly in its smooth garb of white sand. It is wonderful to observe the accuracy of the fishes' handiwork and the perfect circle described by the ring. So far as I could see, the fish moved the bigger stones by pushing them along with its tail.

The whole affair shows a very clever arrangement, the eggs thus being well shielded from enemies, well ventilated by the current and even protected against being mud-stifled (save in case of a down-right flood). Nursing and nest-building habits are not common among fishes, but we know some similar cases, as for instance that of *Chaetostomus pictus*, another kind of siluroid which builds a real globular nest out of blades of grass, or our common stickleback, which faithfully guards and heroically defends his nest, consisting of roots and water-weeds. And indeed our Australian fish does not limit itself to the construction of its nest, but seems to guard it most faithfully, since whenever I saw a nest, there was a fish

swimming inside the ring and most reluctant to leave it on my approach. I could not make out whether it was the male (as with sticklebacks) or the female which guarded the nest. This siluroid is a warlike creature, possessing good weapons in the spines of its pectoral fins. A yet more valiant warrior is another siluroid frequent in the Burnett district, the *Copidoglanis*, called "Catfish" by the colonists, "Gidiri" by the blacks. There are two kinds of this fish: *Copidoglanis Hyrtlii* and *Copidoglanis tandanus*. They possess a strong spine covered with little hooks on each of their pectoral fins. This spine can be raised and kept erect in this position by a particular mechanism. Besides, they carry a similar spine on their dorsal fin. The wounds inflicted by these spines are not only painful but very dangerous, as they generally occasion violent inflammation and swelling of the parts attacked. These seem to be due to a genuine poison contained in the slime which covers the spines as well as the entire body of the creature. Some fish (*Thalassophryne*, an inhabitant of the coast of Central America) possess hollow spines communicating at their bases with a sack containing a venomous liquid, an apparatus having a structure somewhat similar to that of poisonous snakes.

The greater number of my blacks left me at the end of September to go mustering at Cooranga, the Cooranga people having done their best to deprive me of all my hands. As my stay approached its end—my only aim being to rear and preserve a number of more advanced stages of *Ceratodus*—Jimmy and Johnny with their families kept true to me, and I did not feel very disconsolate. I took leave of them in perfect amity, but none of those who left me before the settled time received a *douceur*.

Observing that *Ceratodus*, after leaving the egg, develops very slowly, I clearly foresaw that I should have to stay on for about three months to obtain the advanced stages I desired, and to study the most interesting growth of the paired fins which appear at a relatively late period. Having spent eight months altogether on the Burnett, I could but look upon a longer stay as loss of time. Once more the M'Cords showed themselves true friends in trouble. They undertook the further hatching, rearing, and preserving of my precious nurslings, promising to send them safely to Germany, when the time should have come. Thus they enabled me to direct my attention to new countries and studies.

I accepted the kind proposal of my friends with delight, yet not without qualms of conscience, knowing, as I did, that the task they so readily undertook would bring them a burden of trouble

and work. The preparations for my departure began with the packing of my numerous collections, which I took to Gayndah by dray, on several successive drives, during the following weeks. Thence they were taken to Maryborough on ox-carts, and there shipped for Europe. I spent any amount of care on this packing, and for weeks together I was more of a tinker than a naturalist, handling soldering-iron and tin-solder instead of microscope and dissecting knife. The more delicate and precious specimens I put into bottles filled with spirit. These were firmly soldered into big boxes of galvanised iron, and each of these boxes was further packed in a wooden case. The bigger and coarser specimens were put into cases filled with spirit; the dry collections were simply stowed into wooden cases. At last, my treasures were secured in ten enormous cases, and two barrels. I of course meanwhile studied the growth of my fishes with the greatest attention. They thrived beautifully. I also gathered a series of the development of the nest-building siluroid, *Arius australis*.

In the beginning of October, Ned M'Cord, then a boy of twelve, was my guest for a week. Proudly did the fresh and sturdy lad accompany me to my distant camp, mounted on his own lively pony, while another pony acted as pack-horse carrying his things. This was the first time the boy was allowed to camp in the bush like a grown-up person. His bedroom, a small tent, I put at his entire disposal—his bed, a grass mattress, his fare, damper, brownie, and salt meat—all this, rough and uncomfortable enough, compared with that to which he was used, was the more charming to his boyish tastes, a perfect treat to the healthy mind of this little man of twelve, at least as limited to the course of a week.

The 12th of October was the last day I spent in my camp on the Boyne. I paid the blacks who had kept true to me, and presented them with all sorts of gifts: camping outfit, dress, tomahawks, and extra money. Contented and grateful was their leave-taking. Jimmy and Ada were quite sad at parting, asking me to return again very soon. At noon Andrew arrived with the dray, which we loaded with the rest of the luggage and the collections, all of which was to be taken to Gayndah next day, together with what still remained of my camp. On 13th October the general breaking-up took place. Andrew Wein, Balthasar, and Edmund Haupt accompanied the dray to Gayndah, whilst I myself rode to Coonambula, where I intended to stay for four days before leaving.

This was an unpleasant ride. Not only was I sad to part from my dear old camp, associated with such interesting experiences;

from the white and black companions of my toils, who had proved such faithful fellow-workers; I had that day to complete a most important and difficult task: the transportation of about 200 young fish from my camp to Coonambula, a distance of about twenty miles. Moreover, the way was rough, two rivers had to be crossed, all these difficulties heightened by an intense heat, although I set out shortly after sunrise. I had secured the fish in two large glass vessels filled to the brim with water and tightly closed. These were wrapped in wet cloths to keep them cool, and fastened to the saddle in front of me. Of course I rode at a slow pace all the way. But what if my horse was up to mischief? But a few days ago it had suddenly lain down, rolling itself about the ground so violently that I could hardly find time to save myself by jumping off. The poor creature had probably eaten some poisonous plant and become tortured by gripes. Should this occurrence repeat itself now, all my hopes of attaining the later stages of *Ceratodus*' development would again prove vain.

Slowly, but without the slightest disaster, that long ride came to an end. Every hasty movement of my horse, however, every shake in riding up or down hill gave me a shock through body and soul.

On arriving at Coonambula, after six long and trying hours, I instantly unpacked my vessels to see how the little travellers had borne the heat and shaking to which they were so little used. I found all lying motionless at the bottom of the vessels, a tragic sight. Immediately I put them into fresh water, waiting with intense expectation, but without much hope, for signs of returning life. What I so little expected transpired: for hardly had a quarter of an hour elapsed when some of the fish began to move and to react on being stimulated. After an hour nearly all of them had recovered, and but a small number remained dead, victims of their first journey. The previous immobility of the little party was probably occasioned by their having struggled and jerked about for hours, disturbed by the unusual and incessant shaking of the ride, till they had fainted from sheer exhaustion. Tranquillity and the invigorating oxygen of the fresh water soon brought back their old strength and vitality.

I gave my friends minute directions about the further rearing of the little creatures. They were to be kept in big basins, the water of which had to be daily renewed. So long as the yolk-sack formed a prominence in the abdominal part of the body, the fish would need no food. After the disappearance of the yolk-sack, however, fresh water-weeds of all kinds, specially filamentous algae, were to be offered them. Amongst its net-work the fish would be sure to find

their food, consisting of Infusoria and other tiniest organisms. From time to time a number of the animals had to be killed and preserved according to my instructions. I further gave directions as to the method and the fluids necessary for preserving.

I ask the permission of my readers to remark in advance of my story, that the work undertaken by my friends was brilliantly executed, and that, soon after my return to Germany in the summer of 1893, I received a collection of well-preserved *Ceratodus*, of all stages, from two to ten weeks. A small part only of the fish left by me at Coonambula had died, and that through too good nursing. Man and beast were well taken care of at Coonambula, and the fare was as abundant and substantial as any one's heart could desire. The poor little fishes alone were to have neither bread nor meat, nothing but weeds, of which they did not even partake any visible amount. To be sure this was the reason they grew so slowly. The heart of the mistress took pity upon them. In a fit of revolt against such cruelty and negligence she began experiments in feeding, by separating a small number from the rest, and offering them an ample dinner of meat. On the first day this agreed with them splendidly; they seemed to grow quite visibly. The next morning they were dead and had even begun to rot. *Requiescant in pace*. The fattening experiments were discarded, and the rest of the fish furnished a valuable collection, amply sufficient for scientific study.

During the last four days I spent in Coonambula, the house was full of guests whom chance had brought together. Two days before my departure we all of us undertook a big excursion on horseback and by carriage. We rambled all over the surroundings, so rich in game, shooting ducks, geese, and quail, and catching fish, and finally settled for a grand picnic near Auburn Junction, opposite to the place of my last year's camp, signs of which were still to be seen. My humpy yet existed, though somewhat defaced by time, shrunk in some places and swollen in others, a victim to the caprices of the bark of which it was built.

As a sign of greatest confidence, our party elected me their cook, thus giving me occasion to show whether I had well employed my time, and had become a good bushman. It is not quite easy to cook for a party of twelve if you have nothing but two billies and a box of matches, besides, of course, the necessary objects on which to vent your zeal. I will not indulge in any mystery, but will offer the fruit of my own experience to any reader who may happen to find himself in a similar case.

For one who has a good big billy with him, there is, of course,

no trouble in making tea and boiling potatoes and eggs. But, as for the meat and fish, it is not wise to rely entirely on the boiling treatment, other methods being hardly more difficult, and giving an agreeable change to the tiring uniformity of the fare. Roasting the game on the spit—which may be represented by any wooden stick, the burning of which one has to prevent by frequently wetting it with water—is no bad plan. It is, however, a rather lengthy and tiresome business for one who longs for rest after a long and hot ride. Many kinds of game are delicious when roasted in hot ashes. One has, of course, to clean, but he must not skin the animals beforehand, since they are to be imbedded in the hot ashes as they are, and covered with a good layer of embers. Bandicoots are excellent prepared in this fashion, and hares, rabbits, a gazelle, or a marmot, would be sure to taste delicious baked like this, whereas potatoes baked in hot ashes are even better than those fried or boiled in the usual way.

Feathered game is best roasted on hot stones. The birds are properly plucked and drawn, then laid on the stones and turned several times after having had their body filled with hot stones. A wild duck is very good done in this way, and furnishes a tender and succulent dish, provided it possess a certain quantity of natural fat. Fishes too can be similarly prepared. They are dipped, yet not skinned, then laid on the stones and turned several times. It is unnecessary to fill them with hot stones. The scales are easily removed when the fish is baked.

Sunday, the 16th of October, was the last day I spent at Coonambula, and I cannot deny that I felt rather sad. Parting from these kind friends, parting from them perhaps for ever, saying good-bye to surroundings of which I had grown so fond, to the scenes of successful and gratifying work—all this was hard lines indeed. Though the prospect of receiving new and powerful impressions on my farther travels, of achieving new tasks and realising new aims, tempered my grief at parting, it was still powerless to overcome my regret.

During the whole of my second stay on the Burnett the weather was as favourable as it had been unfavourable the first time. Hardly any rain had fallen; the rivers had been low and full of the densest vegetation. In short, nothing could have been more propitious to my ends. The squatters, indeed, began to look troubled and to fear a period of drought, the worst plague visiting these parts from time to time. I comforted them by saying they were to wait till I should have finished my collection of *Ceratodus*, then I would not mind its

raining as much as ever they desired. And so it was. The very day before my departure the change I had predicted took place. In the evening there arose a thunderstorm of indescribable violence, lighting up the sky for hours by incessant flashes, while the air rang with crashing and growling noises from near and afar, and the rain poured down upon the thirsty earth in torrents. Within a few hours the almost empty tanks of the station were refilled. On my departure next morning the rain continued and the rivers already began to rise, but I had no difficulty in reaching the coast with my luggage. During my drive from Gayndah to Maryborough I enjoyed inside the coach the society of two nice young women, one of whom had till now been barmaid in the Gayndah Club Hotel. This pretty and well-behaved young woman was believed to be my wife at every place we stopped, a great honour for me and a capital joke for the two fair ones and the coachman, which was crowned by my declaring that though she was not so as yet, there was no saying what might happen. In Maryborough, where I remained two days, it continued raining almost incessantly. The passage from Maryborough to Brisbane¹ on the dirty little steamer *Glanworth*, which was moreover freighted with a load of badly-smelling oysters, was very rough, and unduly lengthened, on account of our not being able to pass through the narrow strait between Great Sandy Island (Fraser's Island) and the continent, the load on the ship making it draw too much water. So we had to take a big circuit to the north and around Fraser's Island. From the 25th to the 29th of October I remained at Brisbane in incessant rain, which continued without interruption even after my departure for Java in the *Wodonga* of the British India Steam-Ship Company on the 29th. As I heard by letter later on, this was the beginning of a period of rains and floods for North Queensland, the climax of which was marked by an overflow of the Brisbane River at Brisbane and the flooding of many parts of the town. This flood, had it taken place six weeks earlier, would have annihilated all my endeavours.

The climate of Australia may in general be described as dry and uncommonly healthy. The air is, in consequence of its aridity, nearly free of pathogenic organisms, and might almost be termed "aseptic." As I heard from physicians, wounds heal much quicker there than anywhere else, particularly so in the dry regions of the interior, where they need hardly be protected by bandages. Consumption is very rare, and it is remarkable that most of the cases recover. So do the cases brought here from other parts of the world,

¹ Now connected by railway.

provided they be not too far advanced. Malaria is nearly unknown and limited to the farthest north. Yellow fever and cholera do not exist. The aridity of some regions of the interior is so great as to create deserts devoid of any plants and water. Other extensive parts are covered with the impenetrable Mallee scrub, or with boundless stretches of the cutting Spinifex grass (*Triodia irritans*), unfit as food or home for any higher organised animal, and more terrible than any real desert. The coast districts, however, enjoy a sufficient average quantity of rain to produce a rich vegetation, and to yield a high profit when submitted to proper culture. The richness of certain parts of the east coast, as, for instance, the Darling Downs near Toowoomba in South Queensland, can be well compared to the celebrated agricultural, pastoral, and vine-growing districts of other continents. Even in the interior there are extensive regions which, in spite of their aridity, produce a rich vegetation of succulents, wholesome and nourishing pasture for the innumerable flocks of sheep.

Far worse than the average scarcity of rain is its unequal distribution in the different months, or even for longer intervals—sometimes comprising several years—of very rainy or dry periods. This fitfulness of the rains is a peculiarity of the Australian continent. It is most marked on the east coast and in the interior; less so on the south and west coast. At Sydney the yearly amount of rain varies between 22 to 82 inches. In 1824 Lake George was about 20 miles long and 8 miles broad. By degrees it dried out entirely, and in 1837 it became a grass-grown lowland. After this it filled once more, and in 1865 it had a depth of 17 feet. Two years later it was only 2 feet deep. In 1876 it was once more 30 miles long and about 20 feet deep.

In intervals of five to ten, or even twenty years, one district or another is afflicted by periods of drought which may sometimes last one, two, or three years, and which then change the country into a complete desert. No drop of rain—the rivers dry out, the grass fades, the cattle and sheep perish of thirst, or, even if there remain some traces of water, of hunger. Wherever one turns, animal corpses and skeletons cover the country, a pitiful sight, meaning complete ruin for the possessor of herds, but yesterday master of a well-to-do and flourishing estate.

At last the long-desired rain appears. Not always, however, as a mild and considerate friend, but as a destructive enemy. The rivers rise up high till they overflow their deeply-cut beds and flood the country far and wide, destroying man and beast, devastating.

towns, and covering fields and pastures with sand and mud. There have been instances of a rise of 70, even of 93 feet above the usual river surface, as, for example, of the Hawkesbury River on 22nd March 1806. The smaller edition of an Australian flood which I myself experienced the year before has been described in a former chapter. Much worse, however, was the flood which began on my departure, and which is among the worst the colony has ever known. The most afflicted regions were the Brisbane and the Mary district, not quite so bad the Burnett; but into the farthest north the country was subject to the influence of these violent rains. Three great floods succeeded each other at short intervals. The third, which took place the February after my departure, was the most extensive and destructive. All the lower parts of Brisbane, Tiara, Gympie, Maryborough, and many other places were completely destroyed; many million objects of human industry and skill devastated. Landslips robbed the colonists of the very ground they had built upon, and buried the fertile fields and plantations along the rivers in the waters thereof.

The end of my stay at Brisbane was marked by a very gratifying event. On the east coast of Australia the Dugong, a wonderful marine mammal, the history of which I will further enter into later on, is rather numerous. Its pursuit is very modestly carried on by some white fishermen of Wide and Moreton Bays. They follow the animal with the chief object of securing its fat, which in the popular belief is considered to be a good remedy against consumption. Its meat, skin, and teeth are valued likewise. Ever since my arrival in Australia I had tried to induce the fishermen to preserve for me any embryonic stages they might hit upon in opening the harpooned mother beasts, promising them high payment if they did so. At first my endeavours were in vain. Later, however, Mr. C. W. De Vis, director of the Brisbane Museum, took charge of this business, exerting his influence on the fishermen in my interest, so that on my arrival at Brisbane he was able to offer me three Dugong embryos of different stages, preserved in alcohol. The price I had to pay to the fishermen was a high one absolutely, though low in proportion to the scientific value of the objects. This was a propitious parting gift, so that, light of heart, and with a grateful mind, I, on the 29th of October 1892, embarked on the *Wodonga*, which was to conduct me to the far-off regions of the East Indies.

CHAPTER X

THE ORIGINAL INHABITANTS OF AUSTRALIA

IN the course of previous chapters, I have had frequent occasion to describe the costumes, habits, and characteristics of the Australian blacks. Nine months of close intercourse with these children of nature enabled me intimately to observe their physical, intellectual, and moral character. If I now attempt to draw a more minute picture of them by dedicating a whole chapter to this subject, I do so, firstly, because they belong to the most interesting people of the globe, and, secondly, because till now the popular views about their nature are in the highest degree wrong and preposterous. Former travellers have described them as the very quintessence of bestiality, resembling apes rather than human beings. Their expression was said to be that of beasts ; their body a caricature without either symmetry or harmony ; their intellect hardly any higher than that of intelligent animals ; their temperament cruel, spiteful, alien to all better impulses. Contrary to these opinions, other observers, such, principally, as have not watched these people in their own home and under their usual conditions of life, but who have examined specimens exhibited in Europe for show, have felt it incumbent on them to "defend the Australians against the widely-spread opinion of their particular inferiority." They are described as not unfavourably endowed, and their faculties are set on the same level as those of Indians and Samoyads.

Both ideas are erroneous. The Australians are no link between monkeys and men, but human creatures through and through. Among the inferior human races they, however, represent, in common with several others, one of the lowest types.

On first acquaintance, nearly all human races differing from our own have in their features something repellent to our taste, be they Negroes or Indians, Malays or Papuas. Soon, however, we get accustomed to the strange race, learn to value its very peculiarity,

and are very much astonished at the prejudiced opinions of our later-arriving countrymen, to whom the unusual aspect of face and body in their new acquaintances appears utter ugliness. To my taste, there is nothing brutal in the Australian type. I even prefer these faces, which possess a very marked character all over the continent, to those of several other human races, for instance, to some Mongol tribes, to African bushmen, and to Eskimos. Really ugly appears to me the great thinness of their bodies, particularly of their long but straight lower extremities and the meagre development of the calves. (By the way, no race possesses such a good development of the calves as our Caucasian.) The general leanness of the Australians, particularly of the wildest tribes, is probably due to the character of their food, which is chiefly animal. Marsupials and Echidnas, birds, snakes, and lizards, eggs of birds and reptiles, crayfish and shell-fish, form the main items in their diet. By some of the wilder tribes human flesh is

Old Tom.

considered no despicable delicacy, and a fat Chinaman is regarded as a particular treat. Whilst it is the men's business to procure the animal part of the menu, the women have to dig for eatable roots in the scrub, and to search for mushrooms and palm-nuts, for fruit, grass seeds, honey, sweet resin, and the manna of the gum trees. The indigenous vegetation of Australia is, however, very poor in edible fruit and in amylaceous foods. Whatever grows wild is scarcely nourishing, and the culture of plants of any kind, of Coco-palms, bananas, taro, and yams, is unknown to the Australians. Thus their lankiness may be chiefly attributed to their almost exclusively animal food, so poor in amyloid and saccharine matter. Wherever the natives have occasion to procure themselves farinaceous food, for instance, in the parts where *Araucaria Bidwillii*, the Bunya-bunya tree, grow and bear fruit, or where they come into closer contact with the

whites, receiving from them flour and sugar in considerable quantities, there they are not so lean, and some of them even become quite fat and chubby. Among my blacks, Old Tom, and Maggie, Johnny's wife, were conspicuous for their corpulence. Old Tom was a sort of Hercules, very strongly built, and possessing a finely-developed muscular system, a good model for any sculptor. His corpulence, however, must not be attributed solely to good nourishment, but still more to his splendidly developed laziness.

These two, however, were exceptions. In general the Australians are far inferior to the white races in strength of body, though they make up for lack of real strength by agility. Their size varies, generally amounting to about the middle human measure (5 ft. 5 in.). Tall persons are met with as rarely as very small ones.

The skin of the tribes near the Burnett is of a blackish brown. The same colour I found prevailing near the Mary River, in the blacks I met at Brisbane, and in the tribes of the Cook district. In the latter region I also observed

Johnny.

lighter shades, and here and there even light-brown individuals and families have been seen. These, however, have to be classed with the occasional variations found in all dark races, not as geographically or genetically annectant types.

The hair is of a deep black, its growth very dense in both sexes. The beard of the men is thick and long, covering chin, cheeks, and lips. The male Australians are considerably hairy all over the body, particularly so their legs. One cannot describe their hair as woolly, like that of Negroes or Papuas, nor as sleek or straight like that of Malays. It is rather of a wavy type, forming either loose or crisp curls. Old Tom, who belonged to a more northern tribe, was a representative of the former, Mackenzie of the latter type. Although there exist still greater deviations, as well in the sleek as in the crisp direction, wavy curls are predominant all over the continent.

Their skulls are very powerfully built and decidedly dolichocephalic. Dolichocephaly is more marked and general in

Australians than in any other human race. Instead of the globular vault common to most races, the cranium shows a more roof-like construction. The internal capacity of the skull is small. The eyebrows are very prominent. Frequently we find marked prognathy.

On examining the face one is struck by the curious shape of the nose. Its sides are broad and level, so that the openings of the wide nostrils stand flatly across the face. It is very likely this feature which has induced some observers and travellers to speak of the Australian's resemblance to apes. Even though this single point undeniably reminds us of anthropoid apes, it is most inadequate and exaggerated to extend the comparison to the whole individual. It must not, moreover, be imagined that the nose is entirely flat. Towards the bridge it becomes thinner, and seen in profile it juts out quite boldly, appearing either straight or aquiline, set off from the forehead by a deep depression. This shape of the nose is the most characteristic feature in the Australian physiognomy, and may be found in a more or less marked degree in almost every face. The cheek-bones are nearly always broad, the upper jaw prominent, the mouth large, with full but not protuberant lips. The forehead is rather low, sometimes narrow towards the top, generally of a retreating character. The eyebrows are strongly prominent.

On scanning several faces, one will find one or the other of these points either very strongly marked or, however, quite lacking. The impression of the entire face, and the expression of the physiognomy is, nevertheless, most characteristic, so that we find few races whose representatives are so easy to recognise as Australians. There is hardly any possibility of one's mistaking them for any other race. I believe that had I to choose photographs of Australians from a collection comprising all the human races, I should hardly commit any mistake, no matter whether the depicted individuals be natives of Queensland, Victoria, or West Australia. If a well-known ethnographer declares of Australians, "You will vainly seek in them those distinctly pronounced characteristics which a sharply circumscribed race generally offers us," I reply, "Which are these distinctly pronounced characteristics, and do there really exist 'sharply circumscribed' races of an equal extension?" I even go so far as to declare the contrary. Typical representatives with sharply defined characteristics may be found in any race, as well in Australians as in Negroes, Malays, and Mongols. The variations of the fundamental type are, however, just as great and numerous in other races, not to observe that these are not so

precisely limited on account of the existence of transitional and mixed tribes, which are quite wanting in Australia. The race inhabiting the big Australian continent is so sharply defined with respect to its bodily qualities, its intellectual gifts, and the state of its culture, that there can be no doubt either as to its common origin nor as to the considerable age of its isolated situation, the result of

Three Queensland Boys.

which we see in the absence of what we may term mixed types. I grant that the skin is sometimes darker, sometimes lighter, that the generally wavy hair varies here and there towards the sleek or the woolly type, that prognathy and prominence of the eyebrows are sometimes less pronounced—still, do we not find far greater deviations amongst negroes, at least if we do not limit this definition too rigidly to the inhabitants of a certain small part of Africa? Does not the same phenomenon repeat itself in the case of Malays, Polynesians, Americans, not to speak of races such as the Mongolians

and Caucasians? Smaller nations, like Eskimos and Andamanese, may form still closer unities owing to the circumstance that their limited number does not favour the appearance of variations. Still, I maintain the existence of a sharply defined Australian race which solely inhabits the Australian continent, without sharing it with any other neighbours.

This type is characterised by a series of anthropological and ethnographical features. The influence exercised by the Papuans, taking its origin in New Guinea over the isles of Torres Strait, a small region of the north coast, can be observed in some bodily qualities as well as in some civilisationary signs. It is further proved, beyond any doubt, that seafaring Malays have occasionally touched the north-west coast of Australia, entering into intercourse with its inhabitants. There are, however, hardly any signs left of these relations, and certainly none of a deeper kind. More difficult is the definition of the extinct Tasmanians' relation to the continental race. Perhaps they have originated from a mixture of the latter with immigrants cast by chance into these regions.

I by no means go so far as to allot to the Australian race a primordial purity. This, however, I dare to maintain, that long isolation and the circumstance that the great sameness of the country and its conditions of life do not tend towards creating new variations have combined to form a type of unusual distinctness and uniformity, such as we rarely find outside islands or otherwise isolated countries, but never as the far-spread population of a whole continent. We can, indeed, notice several varieties, without, however, their being distinctly marked. We have not even yet succeeded in determining their geographical limits.

On examining their intellectual and moral qualities, their social culture and habits of life, we find the same uniformity characterising their bodily structure. Here the race excites our interest, not only by what it possesses but by what it lacks, its negative characteristics meriting the same study as its positive qualities.

The culture of Australians up to the present stands on a level comparable to the Stone Age of our European ancestors. The use and treatment of metal is entirely unknown, though, of course, the tribes in communication with whites freely use the steel knives and tomahawks given to them, preferring them when once they have them to their clumsy self-made stone arms. All the weapons and tools produced by the natives are of stone, shell, bone, wood, vegetable fibre, and animal sinew. This fact alone does not, however, prove a very low level of culture.

The intelligently superior Papuans of New Guinea also stand on the level of our Stone Age, as do the inhabitants of the easterly situated isles of the Pacific, except those who have taken part in European progress. The treatment of iron was unknown even to



Australian Weapons and Implements. 1 and 2, Boomerangs; 3, Stone-Axe; 4, Wooden Shield; 5, Basketwork Wallet of Reeds; 6 and 7, Wooden Clubs. (4, 6, and 7 from Burnett; 5 from Cooktown.)

the highly civilised Azteks and to the Peruvians at the time of the Incas, although other metals were extensively used by them. They lived in the Bronze Period, which has also with us preceded the Iron Age.

The chief characteristic, however, of the Stone Age in which Australians live up to the present is the imperfection and crudeness in the treatment of the material which stands at their disposal.

The stone-axes (Fig. 3 of our illustration) are but roughly hewn, not smoothly polished like the stone weapons of Papuans and Polynesians. There are some few tribes which have attained to somewhat greater accomplish-

ment in the neat finish and polish of stone weapons, such as the inhabitants of Hanover Bay and some parts of Victoria, but never do we meet with the art of perforating the stone. The same poorness and imperfection may be seen in every tool, in every weapon, be it made of any material you please. How plain are the clumsy wooden clubs, the ugly unsymmetrical shields, the rough

matting! The shapes are throughout inartistic, and lacking all fancy; decorations are either entirely wanting or of a very elementary and childish style; parallel, mostly rectilinear, strokes serving to hatch triangles and squares. Rarely do they venture on a circle or on a curved line, and where they do the results are not very encouraging, as is shown by the ornament of the shield on our illustration. Here and there we find rough and awkward scrawls meant to represent human beings or animals.

The far superior paintings found by Grey in caves of the north-western parts are certainly the work of strangers who were cast there by chance, and have since disappeared. Whenever one hits upon something above the common mark, one may be sure of its being a production of the north, which is exposed to Papuan influence in its eastern, to Malay in its western parts. I always found that the difference between a tool produced by an Australian, and another wrought by the hand of a Papuan, is as great as that between the slate-pencil scrawl of a schoolboy and the creation of a trained painter, although both nations still belong to the Stone Age. Instead of the graceful patterns engraved as ornaments on the skin of women and girls in New Guinea, the Australians administer several parallel scars, long and deeply cut on the back and chest, the very ugliest and most brutal mode of tattooing I ever saw. A further ornamentation consists in their besmearing themselves with stripes of ochre, chalk, or coal, which they apply when celebrating their Corroborees by nocturnal dances. On these occasions they also like to stick birds' feathers into their hair, especially the yellow tufts of the white cockatoo. In some parts of the continent you find necklaces and aprons in use, formed of feathers, teeth, or shells strung together. Some tribes, however, despise every ornament.

Spear, club, and shield (called "cumare" on the Burnett) are the Australian's main weapons all over the continent, and all three are handled with wonderful dexterity. The spears (called "kane" on the Burnett) are generally thrown by means of a throwing-stick. So firm are hand and eye of the natives that an expert warrior is sure to hit an object as big as the palm of the hand at a distance of 70 yards. The wooden club ("djibir") is very much patronised as a hunting and fighting weapon, not only for inflicting blows, but also as a missile. Another weapon peculiar to the Australian is the boomerang ("barran" of the Burnett), a flat stick of crooked wood, more or less strongly bent, or even of an angular shape. Much has already been said and written about its curious circular, or rather elliptical trajectory. This peculiar hunting and fighting weapon is

used all over Australia. It is an original invention of the Australian native, and the monopoly of this very inferior race, a thing it possesses in advance of all other nations of the earth. For the "trombash" of some Abyssinian tribes, which, according to Sir Samuel Baker, has some likeness to the boomerang, does not return in a circular flight to the thrower. Whether the flat and crooked stick which we find depicted as a hunting weapon on old Egyptian images be a boomerang or only a trombash it is impossible now to decide. Even in Australia a weapon similar to the boomerang, which chiefly serves hunting purposes, is used. It resembles the boomerang in every respect save in its habit of returning to the thrower. Outwardly only a small difference is visible, the plane of the boomerang showing a peculiar twist, while that of the other instrument is perfectly even.

All these weapons have one common quality, be it that they return to the thrower or not; a very gradual sinking of the ballistic curve, and consequently the considerable length and straightness of their trajectory. Whilst the usual result of rendering the trajectory as straight as possible is an increase of the original speed, two altogether different principles are at work in the case of this flat crook-stick. Firstly, the speed is not so soon diminished and used up by the resistance of the air, the flat missile cutting it more deftly than one which offers it a broader side. An expert can fling a *flat* missile twice as far as a cylindrical stick. It is easy to prove the validity of this rule. Every one practised in the flinging of stones knows that one can throw much farther and higher with flat stones, to which one imparts a rotating motion, than with round or many-cornered specimens. The celebrated discus of the Greeks is based on the same principle, and we may even consider the boomerang and trombash as crescent-shaped segments of this.

Secondly, a missile like the boomerang, which is flung with its plane parallel to the surface of the earth instead of moving in a vertical position like the discus, profits by the suspension of its falling tendency, its flat shape making it swim on the air, if I may be allowed this expression. Its descent being very gradual, the boomerang, rotating round its central point, flies much farther than any other missile which is less supported by the resistance of the air. If, instead of throwing a boomerang horizontally, you give it an upward direction, it will gradually rise to a considerable height. All these are advantages you will seek in vain in the simple spears or clubs commonly used as missiles by other races and also by the Australian blacks.

Thus the advantage of the boomerang principally consists in its

flying very far and very high, thereby supplying the place of bow and arrow, the use of which is unknown in Australia. It is very probable that the flat crook, without the above-mentioned twist of its plane peculiar to the boomerang, is an antecedent of the latter. It also is a very useful weapon for hunting and warfare on account of its lengthened ballistic curve. The discovery of the still superior boomerang is not surprising in a people who employ the method of slinging as much as do Australians. They kill any small game with clubs or sticks they swing at it, using for this purpose every bit of stray timber they pick up from the ground. Probably the genuine boomerang derives its origin from such a chance weapon, its finder discovering that a flat stick which had acquired a certain twist of its plane curve by shrinking, showed two wonderful qualities—firstly, it did not fly in a straight direction, but returned to the thrower in an elliptical curve ; and secondly, it had the power of rising gradually during its flight.

Both qualities arise from the fact that the stick, in consequence of its peculiar twist, is turned off from its original track by the resistance of the air, and that at every rotation. The lateral deviation produces its elliptical track, the vertical one makes it rise above its original direction, a thing impossible in any other missile. The upward deviation counteracts the law of gravity, to which, of course, also the boomerang is subject, and keeps it long suspended in the air, thus enabling it to clear an enormous space. In this upward deviation, this rising ballistic curve, and in the consequent possibility of shooting to a distance of several hundred feet, consists the superiority of the genuine boomerang and its elliptical track over other missiles with a level plane, which fly in a straight line like the trombash of Abyssinians and many war boomerangs of Australians. The main advantage of the boomerang is not, however, its returning to the starting-point, but its flying farther and higher than any other hand weapon.

After having discovered what advantages were due to the returning faculty of the boomerang, the natives soon found out a method of giving it the right bend. This is accomplished by laying a flat stick cut out of the crooked stem of some acacia into water, and thereupon hardening it quickly over the fire, whilst twisting its two ends with a screwing movement in an opposite direction, thus giving the plane surface a spiral curve. Besides this weapon they, however, use a plain missile which has not the power of returning. Although it does not fly so far and high, it allows of a far surer aim, and is therefore better adapted for warfare. For although the boomerang

in its elliptical flight is well suited to fetch down a duck or a cockatoo out of a swarm of its equals, it lacks the certainty of aim so indispensable in a weapon of war.

Another species of weapon is represented by a long and pointed stick of hard wood, principally used by the women for digging out eatable roots and wild yams, and, therefore, termed by the colonists "yam stick"; occasionally, however, it also serves as a weapon against the enemy, and as a cruel means of punishing young women who happen to show themselves refractory against the authority exerted by the aged of the tribe in matters of the heart. According to the observations of the cousins Sarasin, a very similar stick is used by the Veddahs of Ceylon.

The art of shaping vessels out of clay, of hardening them by a burning process, thus obtaining pots which will hold hot water and permit the boiling of food, has not been discovered by any Australian tribe, whilst it is in high favour with the Papuans of the neighbouring New Guinea coast. The Europeans of the later Stone Age practised it likewise. It is, however, the older Stone Age or Palaeolithic Period of which the present Australian culture most reminds us, though it is superior to the former in one particular point. This is the existence of a domestic animal, the dingo, which had already been domesticated by this people, before their immigration introduced it to the Australian Continent. In Europe we find the dog only since the Neolithic Period. It has also been the first domestic animal which the inhabitants of America tamed.

The lack of suitable vessels prevents the Australian from boiling his food, he can, therefore, only roast or bake it over the fire or in hot ashes. Wherever he comes into contact with the whites, he soon begins to esteem the advantages of cultivated cookery, and, not being able to produce a suitable vessel out of any material whatsoever, he immediately adopts the tin billy of the white man.

Agriculture of any kind is unknown to the Australian native; this may be said of the entire continent. Only in a few places in the farthest north primitive plantations of yam roots are said to exist, most probably as the result of foreign influence. Save this exception, the culture of the soil, and the growing of useful plants of any sort is unknown to all the Australian tribes, be they of the south or the north, the east or the west. They are nothing but nomadic hunters, and this very circumstance is the reason of their low intellectual level, their scantily developed artistic sense, and many of their curious customs.

The nomadic life, combined with the non-accumulation of

property peculiar to the Australians, and arising from the total absence of herds and of draught and riding animals, as a means of transporting goods in greater quantity, makes the spirit restless. And are not restlessness and instability the very worst enemies of success?

The Australian's intelligence is far inferior to that of any other wild people I have met. The agriculturalist, even should he only grow cactus trees, yams, taro, and bananas, learns to look into the future. He does work, the profits of which will be reaped later on; he thinks of the time when the tree he plants to-day will have grown and will bear fruit; he estimates the time of their ripening, and watches the change of seasons and monsoons. He is bound to reckon with periods of time, thereby learning in a higher degree to think, to reflect, and to calculate. The Greek myth tells us that it was Prometheus the "forethinker" who lifted man above his purely animal state, personifying by this tale the advance of culture. The Promethean quality of foreseeing, and therewith the mainspring of intellect and culture, is completely lacking in nomadic hunters such as the Australians. This want has kept them on the low intellectual level on which they yet stand, and natural selection has not succeeded in effecting any improvement. What it has shaped to perfection are a race of hunters, and unless a new side of human action supervene, demanding new intellectual forces, progress by further selection is hardly possible.

Thus we find the intellect and senses of the Australian brilliantly developed in all directions bearing on the hunt, *i.e.* an excessively sharp power of observation, topographic sense and memory, and a particular faculty of drawing conclusions from the smallest signs and traces, as to the whereabouts, the occupations, and the actual state of the game. All this, combined with great dexterity in the use of weapons, makes any Australian game the helpless prey of these perfect huntsmen. Therefore it is a great error to represent Australians as a half-starved miserable race struggling for life under the hardest conditions. The very contrary is the case. In most of the districts with an indigenous population game is so abundant, compared to the number of inhabitants, as to enable every one to procure for himself and his family as many pounds of meat a day as his heart desires. Of course this refers not only to big game like kangaroos and emus, but also to the numerous smaller marsupials—kangaroo-rats, bandicoots, 'possums—abounding everywhere, which are simply fetched by the lynx-eyed blacks out of their burrows and hiding-places. Therefore it is wrong to say that "hunting is rendered difficult by the purely nocturnal habits of so many

Australian mammals." In this respect, also, I have had the contrary experience. The highest perfection is reached by the Australian in game stalking. Besides this, he is expert in all sorts of tricks to obtain his prey; he mimics the call of birds, makes use of living or imitative decoy birds, drives water-birds into self-constructed nets by startling them with the scream of a bird of prey, and arranges real battues on kangaroos, slyly combining them with bush fires which drive the startled animals straight into the power of their pursuers.

For fishing they use hand-nets. Lazy fish, like *Ceratodus*, are caught in hand-nets by diving. Other kinds of fish are secured by shutting off bays or river-arms by weirs built out of faggots, and by thereupon leisurely emptying them. Near the coast a heavy, generally many-pointed, fish-spear is principally in use, whilst fishing with angle-hooks is quite unknown, save where foreign influence is at work. With a few tribes we find fishing-hooks of wood or birds' claws, probably original inventions made independently of each other in different places, without, however, winning much ground.

On closer contact with the Australian natives, you will at every step observe their utter incapability of calculating and combining. My blacks were just clever enough to lie, assuring me that they had worked diligently, whilst they had in reality dawdled about all day. The faculty of inventing a somewhat more complicated deception, however, they entirely lacked. How easily might they have brought me the young marsupial, which had nearly outgrown the pouch, and its mother separately, thereby gaining double payment! I should not have been able to recognise the deception, and used to pay a fixed price for every female beast without difference, as well as for every young one outside the pouch. Not one of the blacks, however, hit upon this very simple trick. They always brought me the mother with the almost independent youngster in her pouch, not from honesty, but from a perfect lack of inventiveness. To do them justice, however, I must own that, on the whole, my men were honest, and that I was able to trust them more than my African natives on my former, and my Malayan domestics on my later, travels. Where it was possible to deceive me without any complicated mental process, they too were quite ready to do so, and by no means averse to cheating. Some of them lied here and there when asked about something, but on the whole they were truthful. None of them ever conceived the idea of inventing a somewhat elaborate untruth, or of telling tales, since they are entirely devoid of imagination.

Hand in hand with this undeveloped intellect goes an undeveloped but not absolutely ugly language. One's first impression is, that there are many languages, almost every tribe having its own dialect. Careful examination, however, has shown a near relation between the languages and dialects over the entire continent, all of which have decidedly sprung from a common origin. In the north-east some Papuan elements seem to be mixed with the native ones.

Characteristic is the polysyllabicism of the words, their beginning with a consonant and their ending in a vowel, or in a fluid consonant. All the words noted by me on the Burnett, and added to this book as a supplement, show this singularity. As seen in the supplement, the sounds of *h*, *f*, *v*, *s* and *z* are quite wanting, and this seems to be the case with all Australian dialects. A richness in vowels makes the words sonorous, and we often find double vowels and diphthongs. In the inflection suffixes are prevalent.

There is a certain abundance of expressions for concrete objects, such as parts of the human and animal body, beasts and plants, and particularly for grades of relationship. It, however, struck me that the natives by no means always possess separate words for separate things, the difference of which they doubtlessly know. Thus they call all poisonous serpents, whereof there are many kinds easy to distinguish, "wonge," whilst for the edible giant snake, *Python spilotes*, they use the name of "bui." The most various kinds of wild geese and ducks were, without any difference, called "monarum," all kinds of tortoises "miaro." This is really very singular, the more so, since, as I have remarked, all the single things are in fact known apart. Only the capacity of distinguishing by separate words what is in fact distinguished by eye and memory is wanting. The common people in European countries have no separate names either for every animal or for every plant. Still they find words to express not only the difference seen with the eyes but impressed on the memory. Yet more conspicuous is the want of expressions for different colours. My blacks, in fact, only distinguished white ("bambar"), black ("ngurue"), and coloured ("beiar"). The latter expression was used without any difference for red, green, blue, and yellow.

Very poor indeed is the Australian language in the matter of abstract words. Abstract notions being wanting, we, of course, seek in vain for abstract expressions. Thus there are not even collective words for "animal" or "plant." Some tribes know only the numbers 1 to 3. The natives of the Burnett count garro (1), bōō (2), koromde (3), wogaro (4), and construe 5 by combining bōō-koromde. Numbers

exceeding 5 are expressed by "meian" (a quantity). No further counting is exercised either by help of the fingers or of multiplication, as I have had occasion to state. When a native brought me more than five head of a certain animal, or cut me ten or twenty pieces of bark, he was unable to count them otherwise than by cutting so many notches in a stick. Without his stick he felt quite uncertain and helpless, besides showing a very bad memory in these matters, so as not to be able to note by memory the number of notches on another stick whenever they exceeded 7 or 8. The blacks who knew a little English were able to handle the English numbers up to about six. Thence every certainty ceased, and the higher numbers were chosen quite at random. Even Frank, in general a very acute fellow, was able only to cite the names of eight blacks wanting to enter my service, without finding the English number for this group, contenting himself to talk of "many" whenever he had to do with such numbers. None of my blacks when counting made use of their fingers. Mackenzie alone knew how to count to ten by the help of English numerals, besides doing sums of the most primitive sort, as—"Yesterday brought three Echidnas, to-day four—makes seven."

Mackenzie had for a long time been living on squatter stations, and therefore possessed a more energetic spirit than the others. As soon, however, as he had to do with any higher numbers or with difficult multiplications, such as "brought three Echidnas on three days running," his powers ceased. Unscrupulous settlers often abuse this helplessness of the blacks occupied in their service, by abominably cheating them of their earnings.

Some tribes in Western Victoria use their fingers for counting. Although possessing numerals only up to three and the word "hand" for five, they succeed in counting till a hundred by combining these words with signs (lifting of single fingers or the entire hand). These tribes are in general superior to those, the acquaintance of which I made in Queensland. But even the Queensland natives by education, which must then begin in earliest childhood, can be brought to reckon quite tolerably.

On examining the accounts of missionaries, who have had occasion to instruct numerous children of Australian natives, it will be found that nearly all of them come to the conclusion that at the onset of instruction hardly any difference between the faculties of the white and black children in grasping the elements is to be remarked. There is such a capability of memory and sharpness of the senses in the black pupils that in reading, writing, drawing, topography, and geography they at first even excel the white. The

simpler orders of reckoning do not present any difficulties in either. The further, however, the instruction progresses towards subjects demanding a more abstract mode of thought, as for instance grammar or the higher order of arithmetic, the more distinctly their inferiority makes itself felt, and this at an age in which the zeal for learning has not yet diminished, as is the rule in later years.

It is not surprising that the children are clever in learning to write, to read, and to draw, for their parents too are masters in reading all the signs which their game in its hurried flight imprints on ground, grass, and trees. Besides, they are very expert in signalling to each other by self-begotten signs, as by a pointed stick thrust into the ground in a certain direction, by marks cut into the bark of a tree, by message-sticks signed with all sorts of notches and patterns. There are tribes who have a truly admirable practice in these matters.

The success of Christian missions among such an inferior and unstable race as the Australians is naturally very poor. How can a missionary have any influence over a people who are here to-day and elsewhere to-morrow, and who can by no means whatever be brought to settle anywhere? All attempts towards this have proved unsuccessful. If in some places of the south small surviving groups belonging to tribes nearly extinct have been made to collect in little settlements, where they remain, having no other possibility of existence, till the last of them has died, this cannot be reckoned a success. Here and there they are employed by the squatters to help in mustering, and in other station work. Riding behind the cattle gives them pleasure for some weeks. After a few months, however, the old longing for the free and unfettered nomadic life begins anew, and then they will forsake the kindest master and the most enticing luxuries of the whites. This very instability rendered it difficult for me to keep my blacks for any length of time. Wherever a greater quantity of them are assembled, as in North and Middle Queensland, there they continue to live in the old manner, and it is very characteristic that in these very districts, which seem to offer a fit field of action for missionaries, none are to be found. Their absence among the Queensland natives is only capable of one interpretation, it is the resignation of those indefatigable philanthropists, whose ardour knows no bounds, of the attempt to influence the culture of the Australian native. Whilst the greatest exertions are made to civilise the Papuans of New Guinea, and by degrees to christianise them, the Queensland blacks are left to their own devices, in the first place because they seem impervious to education, and then because their decline is unavoidable.

Whenever the blacks come into contact with the white race they are sure soon to die out. Even on the Burnett, where the whites settled only some thirty or forty years ago, and are even now but thinly scattered, the natives are said to be reduced to half their former number. The chief cause is the abuse of liquor, and still more the smoking of opium, the two only habits they acquire quickly and surely from the whites and the Chinese, and for which they show a fatal predilection. Amongst my blacks I had some opium smokers, who, perfectly unfit for any work, appeared quite degenerate and doomed to early ruin. Besides, the acceptance of European dress, or, rather, European rags, which their imitative spirit induces them to wear, proves injurious to this race, as to all other nations living in a state of nature and on such an inferior cultural level. The use of clothes has to be learned, and for savages, who hardly ever change them and wear the same things in heat and cold, letting them dry on the body when wet through, clothes prove a very questionable gift of civilisation.

Can one speak of religion to a people whose language possesses hardly any words for abstract expressions, and who have no sort of worship for any supernatural being, idolatry, sacrifice, and prayer being things unknown throughout Australia?

It is very difficult to answer this question, it being complicated in various senses. Firstly, the numerous tribes inhabiting this enormous area show great differences in matters concerning it. According to the observations of people who have lived a long time among the tribes of New South Wales and Queensland, it is perfectly certain that with the most of them there is no vestige of a belief in any higher superhuman being. There does exist, however, a general belief in ghosts, in the spirits of the deceased who have not received the right order of burial, or who have been bewitched by sorcerers. This I have also experienced among the blacks I have known. Their fear of ghosts showed itself particularly in their unwillingness to leave the surroundings of the fireplace at night, and in their strictly refraining from nocturnal hunting. The belief in the ghosts of dead that have been inadequately buried has led to a very minutely developed system of sepulchral ceremonies, which is, however, different in different places. In Central Queensland the corpses are first dried whole in hollow trees, and the bones buried later on in the ground or within these trunks. Some tribes erect wooden scaffolds to prevent dingos and other animals from disturbing their drying corpses. Sometimes the dead are mummified by smoke, and carried about for some time by the wandering tribe

before they are buried. When this takes place, they generally encase the bodies or bones in bark. In some parts of South-West Australia the dead are burnt. In many places we find it the custom that parts of the dead are eaten by their relatives, a revolting ceremony which is decidedly the result of superstition. Besides spirits they also generally believe in sorcery and witchcraft. Illness and death do not appear as natural phenomena, but as the consequence of being bewitched by strange tribes. The sorcerers of their own tribe have power to vanquish such witchcraft, and exercise all kinds of hocus-pocus to this effect.

While, as I have said, by far the most of the Queensland and New South Wales tribes are entirely devoid of religion, possessing at the utmost a sort of belief in demons and a ridiculous fear of human sorcerers, some southern and western tribes, possessed of a more developed intellect, have risen to a somewhat higher level of religious ideas. They believe in several good and bad spirits who have separate names and separate qualities and attributes. Combined with these they possess some very simple cosmogonic ideas. A certain spirit is considered as founder of the tribe and at the same time as creator of the entire world. Probably it was originally a celebrated warrior and patriot, whose ghost was soon regarded not only as a spirit or demon but as a god,—a passage from demonism to religion, such as may be observed in the development of many races. But, as I have already said, only a part of the Australian population shows this higher stage of development. And even here the religious ideas and myths are still quite vague and misty, and throughout all these tribes no kind of worship is offered to these, as one might say, *developing* gods. The religious ideas of Australians by no means give us the impression of “degeneration” or “decline” as has been suggested at random. On the contrary, they produce the impression of something primitive, of something beginning to take form, and to rise here and there above the level of crudest superstition and nonsense. To speak of a relation to Polynesian traditions seems to me just as little justified—at least if relation is used in the sense of a direct connection. We find corresponding features among the religions and mythologies of all the more primitive races of the earth. The human mind has, in the past and present, struck out the same road towards creating its gods in hundreds of cases. It raises the great dead of the nation to gods and creators, it personifies the powers of nature, the sun as the giver of light and warmth, the fertilising but destructive thunderstorm, and many other things. The similarity of these ideas must not, however, lead us to belief in a

direct connection, unless there really exist a connecting link, and particularly unless names and expressions show an etymologically discernible relation. If this be wanting, the search for points of resemblance becomes a mere trifling. The Australian myths do not even show a positive connection with each other, much less with those of Polynesian and Melanesian tribes. Thus, for instance, Ratzel says : "Nurrundere created the fish in the Lake of Tularung by throwing in stones and drew the islands Witungenggui out of the water with a net. The thunder is his angry voice resounding from the rainbow"—and then "This combination of heaven and earth is a decided Polynesian feature." Just as well, yes, even with greater reason, might one find a connection with northern Germanic mythology, with Thor the god of rolling thunder, the builder of the bridge Bifrost or the rainbow. Him we often find fishing with the giants, he it is who draws the Midgard serpent out of the sea by a fishing-hook. The human mind has often followed the same bent, and connections must be better founded than on such analogies only.

Genuine myths I have not met with among my Burnett natives, though I do not deny their existence. There is, however, no lack of tales concerning sorcery and similar subjects. Frank was much devoted to the recital of these simplest productions of the human mind. "Once upon a time there was a man who was very bad. So the others came and stuck their spears into him. Thus he became a 'Cauara' (Echidna) and the spears became quills." Or, "A lad used to talk and chatter without stopping. So somebody said to him 'you are to talk for ever.' Thus he became a frog." The "Gulla" (*Phascolarctus*) is a bewitched man likewise, and there is a graceful tale about the friendship of a child with a "wonge" (poisonous serpent). When the parents killed the serpent, the child died. There is a similar German tale, and we find corresponding stories about the changing of men into animals with all nations.

This is the only poetry of the Australians, for the words of their songs are generally very little poetical, and limited to short sentences and expressions that are endlessly repeated. Sometimes melody and words are derived from a distant tribe, and are not intelligible even to the persons adopting them. The melodies appear to us monotonous and childish ; not one of them can be compared with the afore-mentioned note of the Australian flute-bird. Singing and dancing is accompanied by clapping of the hands, and by rhythmical stamping on the earth, or knocking on the shields with sticks or clubs. It is very characteristic of the low civilisation of the Australians that, though having a decided taste for singing and

dancing, and though being used to accompany this exercise with rhythmical sounds, the drum, the most primitive of musical instruments, is only found among a few Western tribes, and even here in a very rough form. The general rule is the absence of all musical instruments, which applies to the entire east of the continent. Flutes of bamboo, which have been observed in the north, near Port Essington, are of foreign origin.

The social state of this primitive race is greatly influenced by its nomadic and hunting life. No agricultural interest ties them to a definite part of the country ; as soon as their hunting has exhausted the game in a certain district, they move on to another. Thus they pass their lives in improvised huts of bark, in some districts in arbours of brushwood, or even in caves below the ground. This prevents the formation of villages or towns, and consequently of states. Every native limits his possessions to what he and his family can carry about with them on their wanderings, and weapons and tools are so simple that any one can easily himself manufacture whatever he wants. These things, moreover, possess no value that might rouse the covetousness of others, and make it necessary to defend oneself against encroachment by uniting in bigger associations. It is only its own hunting-district that is carefully guarded by every tribe against the aggression of its neighbours. We find, however, that in general the boundaries are respected, that nobody dare encroach upon the chase of a strange tribe, and that disputes about transgression are very rare. This is probably owing to the vast dimensions of the separate hunting-grounds, and to the fact that since time immemorial over-population, arising from the over-fertility of a tribe, has been prevented by a number of artificial means.

It is property which principally makes men dependent on each other, being the main source of power, the main means of suppression ; and it is the lack of it in the Australian race which renders its tribes so free and autonomic. There is nothing which might tempt them to suppress a strange tribe, nor do they possess anything to incite the conquering tendency in others. Thus we hear nowhere of fights for superiority. The seizure of women, a murder here and there, very rarely a mere quarrel about some boundary, give rise to fights of a mostly harmless nature. If we find that everywhere the tribes live in perfect independence of their neighbours, we likewise find the principle of general equality observed within the tribe itself, mainly as the result of the fact that there is no difference between rich and poor. In short, we find that in most respects there reigns

a communism, the liberty of the individual being limited by severe laws and customs which have developed during ages, and which every one without difference has to obey. They accord some privileges to the older people, which are equally open to any one who has attained a certain age.

In most tribes the old people exercise a sort of authority which is, however, limited to certain matters, particularly to those concerning the initiation of marriageable youths and maidens. Besides this, every grown-up male is free in all his actions and never the obedient servant of another. Most of the tribes choose a kind of chief, a prominent warrior, hunter, or sorcerer, whose advice has particular weight, and who acts as leader in case of a common enterprise. In general his power is much restricted, and when he is obeyed he is so voluntarily and not by force. He is not allowed to form laws for the community nor to dictate to the individual. A chief of influence and power is quite an exception among the Australians. One such, however, is the celebrated Jalina Piramurana of the Dieri in South Australia (Barcoo River), whose courage, cleverness, and eloquence have procured him an influence the power of which spreads over a district of thirty miles. This case, however, is the only one of its kind. But even in this, and in similar instances of one man's influence among his tribe, the power is bound exclusively to his person without devolving on his posterity or on other members of his family. His children are in no way superior to other persons of the tribe.

As to its political state, the horde has to be regarded as a unity, a small local association of usually forty to sixty persons, inhabitants of a common hunting and rambling area, considered by them as their property, the entrance to which is not allowed to any other blacks without special permission. At the same time, however, the horde entertains certain relations to neighbouring ones who speak the same or a similar language, and observe the same laws and customs, but the said relations have more the nature of kinship than a political character.

During the last decennium, the regulations as to kinship among Australians have been attentively studied, and the thorough investigations, which we owe principally to missionaries, have furnished us with a collection of facts enabling us to get an insight into the organisation of numerous Australian tribes. The matter, however, is so complicated that a clear statement, be it only of the fundamental principles, would occupy several sheets, even if all details of lesser importance be omitted. I will therefore only

devote a few words to these questions, although they are of vital ethnographical interest, as concerning the primitive state of the human family and social organisation.

There is reason for thinking that originally the Australian hordes were not only politically autonomic but also quite independent of their neighbours as to wedlock, marriages being only allowed within their own horde, which thus was rendered strictly endogamous, although this primitive state is not found to survive anywhere. As, from reasons of national economy, the hordes are, and have to remain, small, consanguineous marriage and continual alliance between brothers and sisters or cousins would be the necessary consequence; and, in consideration of the work of Darwin on plants, and the coinciding experiences of breeders of plants and animals, which have proved the danger of long-continued intermarrying and the advantage of occasional cross-breeding,¹ it is a matter of great interest that the native Australians have observed the bad influence of continued consanguineous marriage. A tradition of the Dieri tribe in South Australia proves this, saying that "originally fathers, mothers, brothers, sisters, and other closely-related persons used to marry amongst each other, till the bad consequences of such alliances were distinctly visible." The prohibition of marriage between persons of different generations; parents to children, uncles and aunts to nieces and nephews, which we find existing with all Australian tribes, did not, however, radically improve matters. Marriages between brothers and sisters, known by all breeders as particularly precarious, and between cousins had, above all, to be forbidden. Thus in many hordes the possibility of endogamic wedlock became excluded. Consequently the relations of neighbouring hordes with the view to marriage and exchange of marriageable girls were controlled. As, however, the correlation between two or three of these small hordes did not suffice to remedy the evil, the circle had to be widened, and over an extensive part of the country the hordes entered into relations with each other concerning marriage, forming a connection wearing rather a familiar than a political character.

Matters lie most simply where, besides the prohibition of inter-marriage between different generations, we find a rule forbidding a man to take to wife a relative nearer than in the fifth degree. Thus it is impossible for two people, the great-grandfathers or great-grandmothers of whom were brothers or sisters, to marry. This is the marriage-law of the tribe of the Kurnai in Gipps land (East Victoria), and of the Gurnditschmara, a tribe related to these,

¹ An excellent discussion of this question may be found in Darwin.

but living more to the east near Lake Condah. In the latter people, however, the prohibition of the intermarriage between relatives is not quite so severe as with the Kurnai. These simple and reasonable laws suffice to obtain all the ends worth pursuing, namely, the absolute exclusion of consanguineous marriage without further and unnecessary restrictions.

In spite of these evident advantages, most Australian tribes, like most other people who are exposed to the danger of consanguineous wedlock, follow other systems, which, although more complicated and less obvious in their effects, are easier to manage.

For consider how minute a knowledge of the pedigree of every single individual, how intense a study of every genealogical detail for generations back is necessary to enable a youth on the point of marrying a girl of a distant tribe to find out whether one of his and of her great-grandparents were perchance brother and sister. In a people lacking a written language, this seems to me almost impossible to ascertain, and I doubt whether even the Kurnai, in spite of their geographical isolation, and of practice continued through generations, though possessing an elaborate nomenclature in matters of relationship, will have always succeeded in observing their own laws.

Very simple and easy to manage is the marriage system of the Narinyeri, a tribe living near the mouth of the Murray in South Australia. They form an association of eighteen hordes, which are perfectly autonomic. Now it is strictly forbidden to marry into the horde of one's father (*viz.* one's own tribe) or into that of one's mother. This simple and practical institution renders marriage between brothers and sisters impossible. Marriages between cousins, however, are only excluded so far as the marrying parties are children of two brothers or of brother and sister, not if they are children of two sisters, unless these latter should have happened to marry into the same tribe.

Every horde of the Narinyeri takes its name, not, as in other hordes, from the locality it is living in, but from a plant or an animal. In Australia these terms or totems are only names. Adoration and worship are nowhere offered to the totem-animal or the totem-plant. The Narinyeri hunt and eat their totem-animals, only taking care lest the remaining morsels should fall a prey to sorcerers. Other tribes try to avoid killing their totem-beasts, refrain from eating them, and, when hunting, give them every chance to escape. This, however, is the highest regard accorded them. Originally, the Narinyeri possessed a separate peculiar

token for every single tribe, but some time ago this underwent a change, several hordes merging and becoming incorporated in one collective horde. According to the general Australian custom the children belong to the horde of the father, and as the totem on this stage of social development is nothing but a name for the horde, the children adopt their father's totem. As with the Kurnai, *paternal* right reigns in every respect.

We find very similar institutions with the Turra, the western neighbours of the Narinyeri, except that the development of this people has gone somewhat farther, their hordes being divided into two main groups. Marriage within one of these groups is forbidden, and the men of the one have to seek their wives within the other. Not only the horde but also the group is thus rendered strictly exogamic.

There are, however, some tribes which show a remarkable difference in respect to the customs just described. They too consist of a number of hordes of a politically perfect autonomic character, and here too the children belong to the horde of the father. The totem, however, is inherited by the children from their *mother*, it is a mark of *family*, not of *horde*, a mark left by the mother upon her progeny, similar to our custom of inheriting the father's name. The women, whom marriage leads out of different hordes into a new one, carry their totems with them. Thus in every horde we find all, or at least most, of the totems of the tribe united.

It is commonly said that maternal right reigns within such tribes. This, however, is not quite so, since the appurtenance to a certain horde is transmitted from father to child, and with it the only form of property the native possesses—the claim on a certain hunting-district. From his mother the child only inherits the totem, and with it some rights and duties concerning marriage, revenge, and sepulchral rites.

Here the marriage laws do not seek to prevent wedlock between relations by outright prohibition or by exclusion of the paternal or maternal horde from the choice of wives, but they lay the more stress on regulating the connection between "gentes" or totems. It is interdicted to take a wife out of one's own "gens." Thus marriages between brothers and sisters are just as absolutely excluded as by prohibition is marriage into the horde of father or mother. The marriage of cousins becomes thus limited, though not radically excluded, since though wedlock with the descendants of the mother's sister is excluded, this is not the case with descendants of her brothers, his children receiving their totem from their mother, a member of another "gens." Some tribes, for instance the Dieri,

have, however, special laws forbidding these marriages. Besides, several "gentes" or totems are considered as nearly related, and therefore forbidden to intermarry. Most frequently all the gentes of a tribe are subdivided into several groups, called "Phratries" by ethnographers. Members of one phratric have to fetch their wives out of the "gentes" of another.

This organisation of the hordes suffices to prevent consanguineous marriage in a perfectly satisfactory manner. It is much easier to manage than the system of the Kurnai, working almost by itself without demanding any complex study of genealogy. Its advantage above the systems of the Narinyeri and Turra, which simply forbid marriage into the horde of father or mother, is that it does not prevent so many marriages between persons who are, in fact, in no way related. Within the horde of the Narinyeri, known to us as so severely exogamic, the individuals will be but widely or not at all related to each other. Nevertheless, their laws forbid a connection between them, an unintended and detrimental result. The hordes subdivided into gentes in the above-defined sense are not so severely exogamic, permitting as they do marriages between certain "gentes" within their limit.

Most complex is the system of relationship in the tribes of middle and northern New South Wales, and south and middle Queensland, as, for instance, in my blacks of the Burnett. With a division into gentes, perfectly coinciding with that just described, there runs along another seemingly very complicated system with a most intricate nomenclature. This second system has no other aim or consequence than the following: Let us suppose two gentes, the members of which are allowed to intermarry freely. Now, if we signify the four consecutive generations of grandparents, parents, children, and grandchildren, by the letters A, B, C, and D, it is permitted that generation A should marry into A, B into B, C into C, D into D; not, however, that A should marry B; B, C; or C, D. Sons are quite free to marry the daughters of a certain woman, not, however, sisters, and *vice versa*. If they be allowed to marry her sisters, a connection with the daughters is impossible, even should they suit better in the matter of age. This very singular rule has most probably the object of forcing the men by these impediments to seek their wives not only in the neighbouring but also in the more distant hordes of the tribe, so as to attain a thorough mixture and variety among its members.

Every horde consists of three classes—the children, the adults, and the old. The passing over from one phase to another is

celebrated by elaborate ceremonies. Particularly so the initiation of the grown-up youths, which is a matter of general importance in almost all tribes. The young men in question are submitted to all sorts of trials, one may even say tortures. Some tribes submit them to circumcision ; others make them undergo a process of tattooing or scarring, cutting deep gashes into various parts of their body ; others knock out two of their front teeth. This is accompanied by all sorts of fantastic ceremonies, from which the women and children are excluded, as, for instance, the covering of the victim with blood. All this generally ends in a nocturnal festival, a so-called Corroborree, at which the men, adorned with feathers, their skin besmeared with paint, execute grotesque dances, whilst the women accompany their choreographic feats by songs of a uniform character, and by rhythmical knocking and clapping of the hands. Sometimes one of the women takes part in the dance, a particular honour for her. The initiation of the girls is generally an affair of lesser importance, though it likewise is almost always accompanied by a certain solemnity.

Thus youth and maiden are declared adults and fit to marry. The girl is not consulted, but given away by her father or her brothers, generally exchanged against a girl of another horde or gens. On the occasion of marriage all the rules of the horde are strictly followed. Any deviation from them is considered an enormous crime and visited with the severest punishment on man or woman.

Most tribes live in monogamy, and this because the scantiness of the population and the complex character of the marriage laws render it difficult enough to find even one suitable wife. No rich men existing, there is no possibility for any one to procure himself a harem by purchase. A father of many daughters, a brother of many sisters, however, is well able to get several wives by barter, a prohibition of polygamy existing nowhere. For the reasons just mentioned, however, that will always remain an exceptional practice.

The wife is the slave, a beast of burden to the man ; she is excluded from all rights, victim to the untamed brutality of her master. He watches her jealously, beats her most cruelly, inflicting ghastly wounds on the poor creature as soon as ever she incites his anger or suspicion. Of course temperaments and characters are different even among the Australian savages. Johnny was often very cruel to his wife ; old Jimmy, on the contrary, lived most harmoniously with his Ada.

In spite of the jealousy with which the Australian guards his wife's faithfulness, some tribes follow a custom by which the

brothers of the husband live in a sort of collective wedlock with their sister-in-law, granting, if they themselves be married, the same advantage to their brother. The repeatedly mentioned tribe of the Dieri permits whole groups of persons to live in this sort of wedlock, called *Pirauroo*-marriage. Every husband occasionally cedes his own wife or *Noa* to his fellow-husbands, having the same right with regard to their *Noas*, whom, together with their husbands, he designates as his *Pirauroo*.

It has been asserted that wedlock of this kind must have arisen from consanguineous marriage, and an endeavour has been made to deduce the matrimonial system of the Australians and several other nations from this custom and from a kind of collective wedlock existing on Hawaii, and there called *Punalua*-marriage. The principal argument for this hypothesis consists in the fact that not only Australians, but many Indian tribes, besides some Kaffirs, Dravidians, and other primitive nations are found to call not only their real fathers, mothers, brothers, and sisters by these titles, but also numerous other persons only distantly related to them—a most astonishing custom which has not yet been sufficiently explained. Sometimes these designations are used within the whole contemporary class of a *phratric*. The titles of husband, wife, child, and grandchild are misused in the same way. These common designations of close relationships are by some writers thought to arise from *Pirauroo*-like systems. This, however, is not the case, as Heinrich Cunow has shortly proved in a satisfactory manner, thereby disproving Lewis H. Morgan. On comparing the nomenclatures of the primitive nations whom Morgan enumerates as proving his assertions, we can at once discard the hypothesis, that a collective wedlock of the *Pirauroo* kind was the root of the vagueness as to paternity and relationship in general. For was there ever any doubt as to maternity? and still the title of “mother” is just as generally misused in those tribes as the others. Neither must the gens be taken for a higher developed form of the *Pirauroo* (or *Punalua*) group, nor must the marriage-classes of New South Wales and Queensland be considered as arisen from a collective wedlock formerly existing there. This latter is, moreover, an institution which we do not find in the most inferior natives, but in a tribe of relatively high standing, the Dieri. Altogether its appearance in other parts of the world is by no means peculiar to races of the lowest culture, for, next to Hawaii, we find it in the relatively cultivated Tahitians, the Naires of the Malabar coast, the Todas of the Neilgherries, and certain Singalese.

Neither do I follow Morgan in his hypothesis as to consanguineous marriage being the first step towards collective wedlock and the original form of human wedlock generally speaking. It is impossible that marriages between brother and sister should have existed for a long period together, or should have formed a fixed institution favoured by habit, since they are so inevitably conducive to degeneration, and therefore destructive to the race. In the case of animals and plants this has been proved by experiment, and by the experiences of breeders ; and as regards man, by the fact that all nations on earth prevent such alliances by law or by custom. This is the rule throughout the world, and it is a rare exception if we find consanguineous marriage tolerated anywhere, or introduced in dynasties where it usually owes its existence to political causes. The general intolerance of such marriages arises neither from an inborn antipathy against them nor from the distaste of persons brought up together to unite in wedlock, but from the oft-repeated experience that the offspring of frequent intermarriage are in no way equal to the descendants of crossed breeds. The marriage-customs and laws of nations are but the result of these observations.

As we have seen, the initiation of the young man, the ceremonies attached to it, and the purchase of generally one single wife are the principal events in the life of the Australian, and at the same time those most dependent on rules and laws. A farther step of much importance for both sexes is the progression from the class of younger adults into that of the old. This usually takes place when the oldest child of a couple is declared marriageable. Whilst children are forbidden to partake of certain kinds of food, the number of permitted dishes increases as soon as the child is declared grown-up, and the old ones enjoy an almost unlimited freedom. This is a sly arrangement of the old, by which they ensure to themselves the lion's share of the game, without fear of being accused of injustice, since the younger people really believe the forbidden dishes unwholesome. Nevertheless, it must not be thought that these prohibitions are the consequence of a studied scheme of the old people, they are rather that of a superstitious adherence to former patriarchal customs.

If the hordes of a tribe are to live near each other in peace and amity, it is necessary that the number of the populace remain stationary. Provided the hordes increase, it would grow impossible for all to exist upon the yields of hunting and fishing and upon the produce of the wild-growing plants. As things are, the land is able to nourish only a scanty populace, so that we must regard

it as a fitting accommodation if the Australian tries by artificial means to prevent the growth of the tribe, and thus render the population stationary. Some tribes attain this by exposing or killing a certain number of new-born infants. Others castrate a number of the youths as soon as they are grown up and before they enter the class of the adults, or render them infertile by slitting the urethra (Hypospadiæ). The youth in question is decoyed away from the camp by a conspiracy of the old men, and then thrown down and mutilated. The operation is achieved by means of a sharp stone knife, and the closing of the wound is prevented by inserting bark between its edges. In some tribes we find it a custom that every man submits to this operation after the birth of his second or third child.

At certain intervals of longer duration, about once in the course of from one to several years, most tribes assemble their hordes for a grand festival, a so-called Corroborree. During my stay such a one took place at Dykehead in December 1891. Having had at that time differences with my blacks, and having consequently been forsaken by them, I heard nothing of the affair, and regret not having witnessed this interesting and instructive spectacle.

On the occasion of these grand Corroborrees marriages are arranged, wives bartered, festivals are celebrated by nocturnal dances. Here and there it occurs that a certain licentiousness gains ground, and the spirit of the whole is by no means always peaceable, it being the custom to use this occasion for the settlement of existing disputes. Sometimes this is done in a peaceful manner, but at others the spirit of revenge seeks and finds his victims, and we often find the hordes of a tribe opposing each other in open fight.

The physical and mental picture I have tried to sketch of the Australian shows us a special type, a race of but few and slight varieties. In every respect it affords us an example of one of the most primitive types of humanity yet discovered.

Lower still than the Australians stand the Veddahs of Ceylon, as well with regard to their bodily as to their mental qualities, save where they have been touched by civilisation. And lower too are some tribes related to them (Juangs, Kurumbas), inhabitants of Southern India, designated as monkeys by the Indian epic *Ramayana*. This, however, is just as untrue in their case as in that of the Australians, but the state in which they live is yet more primitive than that of the latter. They have indeed bow and arrow, but not of their own invention, and they do not even possess the art of forming sharp instruments out of stone, formerly at least they only used

sharp mussel shells for cutting and as points to their spears. At present the Tamil smith furnishes them with iron tools for these purposes. They often lack every vestige of an ornament, and even the rudest tattooing is unknown to them. On entering marriage they celebrate none or but the rudest ceremonies. Sepulchral rites are entirely wanting, and all they do is superficially to cover their dead with leaves or earth. The original Veddahs believe neither in good nor in bad spirits, and ideas as to an existence after death are rarely met with and at the best exceedingly vague. Their dances express a kind of worship for the arrow, and they murmur some sort of spell when meeting wild beasts in the wood. Numerals exceeding one are entirely wanting, as is also the faculty of counting by help of the fingers.

These features show the Veddahs to be decidedly inferior to the Australians, whereas, in general, there are many points of likeness between these two low races. The marriage system of the Veddahs has not yet been studied, but their wedlock is strictly monogamic, and the treatment of their wives better than is usual by Australians. Conjugal fidelity is jealously guarded. The fashion and attainment of food is very similar to that of the Australians; the families seem to live more separately, though united in clans, of the greater of which there are nine. These nine great clans do not intermarry. The clans and great clans have no real chiefs, though there are persons who act as spokesmen to strangers and who exercise a certain authority. Regular assemblies of the tribes in the way of Corroborrees are not held, though on special occasions they meet for council.

The hunting nomadics of Central Africa, viz. the Akkas and other dwarf nations of the forest districts, furnish us with another example of a very low race. Their mental capacities and social institutions are almost unknown to us. They, however, seem superior to the Veddahs, and rather superior than inferior to Australians. The same may be said of the South African hunting tribes, the nomadic Bushmen, probably related to the above-mentioned dwarf-tribes. The civilisation of Patagonians hardly rises above that of the Australians, but recent investigation has shown that it certainly is not inferior to it. The primitive aborigines of South America, described to us by Von den Steinen, and the Esquimaux are on a much higher intellectual and moral plane.

Here and there we find the opinion that the Australians are a degenerate race. Their ancestors are declared to have possessed a

much higher culture, which was gradually lost after their settlement in Australia, as the arid character of that continent offered particular obstacles to an agricultural life. This statement lacks all positive proof, and there is no evidence for its validity. Nothing in the life, the language, or the traditions of the Australians, no monument of their skill proves the former existence of a higher culture lost in the lapse of centuries.¹ The Australian climate near the coast is generally perfectly adapted for the cultivation of numerous useful plants. Had their forefathers possessed a knowledge of the cultivation of such fruits as the wild yam, there were no reason why their descendants should have given up growing this useful vegetable. These plants clearly appealed also to the shipwrecked immigrant, who had no seeds or shoots of any sort with him, for a species of wild yam abounds all over Australia and is eagerly collected by the wives of the natives. The Australians make use of a quantity of other indigenous plants, but no plantation of any sort has been found except in one single place on the west coast, where a species of *Dioscorea* is cultivated.

From this it is evident that the forefathers of our Australians on entering the continent certainly possessed no superior, if not an inferior, culture to that of the present day. They must have brought their only domestic animal, the dingo, with them, as the Australian continent originally possessed only marsupials.

It is very difficult to decide whence and in what way the immigration took place. In all the world there is not a single race which appears nearly related to them. Their next neighbours the Papuans of New Guinea, the Malays of the Sunda islands, and the Maori of New Zealand are altogether different races.

Far off among the primitive tribes of India we however find the Dravidian types, who, in an anthropological way, very strongly remind us of the Australians. Respecting the hill-tribes in the interior of the Dekhan and their resemblance to the Australians, Huxley says that an ordinary coolie, as found among the crew of almost every ship on its return from the East Indies, undressed to the skin, might pass as an Australian; but the skull and lower jaw were generally found to be less coarse. I think that Huxley goes a little too far in his acceptance of their similarity. Certain it is that a number of characteristic features, the cranial formation, the face and the wavy hair, show a distinct relation between the

¹ Some remarkable cave-paintings near the Glenelg River in North-West Australia are decidedly the work of shipwrecked Europeans, as is proved by the European types of the faces and heads, and by their being clothed in long garments, hats, and shoes.

Australians and the Dravidians, which is further proved by the linguistic investigations of Norris, Bleek, and Caldwell, who have discovered a number of striking resemblances between Dravidian and Australian idioms. As the present homes of these two races are so far apart, and separated by so many nations whose languages are not in the least related either to Australians or to Dravidians, this resemblance gains peculiar interest and importance.

There are, however, other reasons for supposing that Australians and Dravidians have sprung from a common branch of the human race. According to the comprehensive inquiries into this matter by Fritz and Paul Sarasin, the Veddah tribes of India and Ceylon would appear to represent a side-growth of this main branch, which we might designate as pre-Dravidian. When they separated from the main branch, the latter stood on a low level, and since then they seem to have made no progress worth mentioning. The Caucasians have undoubtedly sprung from the Dravidians, and thus we may look upon the low Australian natives as more nearly allied to us than the comparatively civilised Malays, Mongols, or Negroes. Several observers have already stated that the physical features of the Australians, in spite of their so-called ugliness and coarseness, may be decidedly compared to the lower Caucasian type, and a glance at the portraits in this book, representing pure-blooded Australians only, will prove my assertion; for could not the group on page 41 well represent a company of European scamps, particularly if we look at the features and figures of Frank and Harry?

Some people feel it as a degradation of the human race if science draw from the results of her investigations the conclusion that man is an issue of animal inhabitants of the earth and stands in a kind of relationship to the monkeys. These same persons will not be pleased to think that within the human race we Caucasians, who have for so many centuries thought ourselves very superior, are closely related to the nomadic savages of Australia, and to the Veddahs figuring as monkeys in the Indian myth. Science, however, does not care whether her results be pleasing to the taste of the individual, but solely whether they are in accordance with truth. I myself do not see anything degrading in the thought that we belong to a society which has worked its way step by step from an animal origin through phases represented by Veddahs, Australians, and Dravidians, up to the present, to my feeling, pretty modest height of Caucasian civilisation. On the contrary, I feel elated by the certainty that the development of humanity has not come to its end

either in a physical or in a moral sense, and that our present civilisation, rich in faults and shortcomings as it is, will, for our far-off posterity, present but a stage of development to be regarded by them with the same smiling and indulgent superiority that we have for the intellect and for the civilisation of the Australians and Veddahs.

CHAPTER XI

THE NORTH-EAST COAST OF AUSTRALIA FROM BRISBANE TO CAPE YORK

TWICE I travelled along the north-east coast of Australia from Brisbane to Torres Straits, and once I took the same route in an opposite direction. Thus I had occasion to become acquainted with the country in its various parts and to stay at different places. I prefer giving an account of all I saw and heard in following the geographical line from south to north instead of arranging my reminiscences in the order of my journey.

On looking at a map of Australia we remark a long mountain range which follows the entire east coast from the farthest south to the York Peninsula in the farthest north, going even beyond the latter and extending over the islands of Torres Straits as far as New Guinea. These mountains, adequately designated as Australian Cordillera, reach their greatest elevation in the south, where the highest summit of the Australian Alps is represented by Mount Townsend, and somewhat north of it Mount Kosciusko (7308 feet). The farther northward we go the flatter become the mountains. Bellenden Ker, however, to the south of Cooktown, in North Queensland, attains a height of more than 5000 feet. The greatest part of this range rises steeply from the coast or its neighbourhood. In the Burnett district the distance from the main range to the coast is greater than in any other region. In general the direction of the mountain range is simply from south to north, with a north-western deviation towards its northern end.

Granite and porphyry, Silurian and Devonian deposits, constitute the skeleton of these formations. The older rocks are for the most part steeply, sometimes almost vertically folded. Since during the Carboniferous or Permian age the east coast emerged from the sea, it was not again covered by water till the Cretaceous period, as is proved by the entire lack of marine deposits during the Triassic

and Jurassic periods. Instead of these we find several plant-bearing deposits, the flora of which agrees conspicuously with the European and Indian flora of the same period. Hereafter we again find marine deposits dating from the Cretaceous period. Post-cretaceous marine deposits are entirely wanting, at least in New South Wales and in Queensland, but a large part of South and West Australia must, during the Tertiary period, have been covered by the ocean, as is shown by its fossils.

At present Australia and Tasmania do not possess a single active volcano, and there are no proofs that any volcanic action is now going on. Everywhere, however, we find not only older volcanic rocks, which are of such great importance to the country on account of their containing gold, silver, and other metals, but likewise more recent basaltic eruptions reaching down to the Miocene period. In Victoria and in the north there are signs of yet more recent eruptions, for here we find among and under the ashes of volcanoes not only the remains of Pliocene giant marsupials, but also of the dingo, imported into Australia at a much later period by immigration.

The southern part of Queensland may alone be described as really colonised. The farther we travel towards the north, the rarer do the big settlements become, the more are they limited to the coast. A coast railway leads from Brisbane by Gympie and Maryborough to Bundaberg, near the mouth of the Burnett. This railway has now an extension to Gladstone, but the northern towns keep up their intercourse with the south solely by the boats of the Australian United Steam Navigation Company. Some places, like Rockhampton or Townsville, possess a local railway line leading to the gold-mines inland and ending there. The creation of a railway connecting the flourishing north and its wealth of natural resources with the capital, and thereby with the other colonies, is a thing of the future, and would add much to the development of the colony. The economic depression from which not only Queensland but the whole of Australia has been suffering for a number of years has prevented the execution of this idea, which has a warm supporter in the well-known Queensland politician, Sir Thomas M'Ilwraith, but it must be admitted that at present an enterprise of this kind would hardly flourish. In ten or twenty years, however, it will be practicable, and certain of success.

A voyage by steamer from Brisbane to the north end of Australia, including short stays in the principal places of the coast, lasts nine or ten days, and is one of the most charming and interesting trips

imaginable. Maryborough I have already described. At Bundaberg, near the mouth of the Burnett, I made a stay of several days, profiting by the occasion to gain an insight into the sugar plantations forming the wealth of those districts. They are worked in a similar way to those of Maryborough, and since the importation of black labourers from the South Sea Islands is once more permitted, this branch of cultivation is most flourishing. It is to be hoped that the new law controlling the mustering, keeping, and returning of the "Kanakas" will stop the revolting cruelty in the treatment of these "free labourers," which forms so dark a page in the short annals of Queensland.

One degree of latitude north of Bundaberg we come upon the little township of Gladstone, and on following the coast northwards we pass the Tropic of Capricorn. Doubling Cape Capricorn, we enter the wide Keppel Bay, into which Fitzroy River pours its waters. The Fitzroy, like its tributary the Dawson, which nearly equals it in size, is one of the most important streams of Queensland. Its course measures about 400 miles, and the country on its banks is particularly fertile, equally adapted to the breeding of sheep and of cattle. At Rockhampton, 35 miles from its mouth, the river is still passable for vessels of 1500 tons. There the passenger has to change the large vessel for a tender which takes him up the river, the banks of which are grown with dwarf-like gum- and tea-trees. Only a part of the broad river-bed, a narrow track carefully marked by buoys and signals, is navigable for bigger vessels. On approaching the town the hills and mountains of the Australian Cordilleras appear in the distance.

Rockhampton, on the right bank of the Fitzroy, is the greatest town and the most important harbour of Central Queensland. Its population amounts to 12,000. The town is distinguished by a quantity of stately government buildings and commercial establishments. Its streets are wide and well kept, and quite lively in the commercial quarters, and the whole has a less unfinished and improvised character than is usual in the towns of northern Queensland. The Criterion Hotel, where I took up my abode, was excellent, and equal to any of the best Brisbane houses. Here I met one of the missionary pioneers of New Guinea, the Rev. W. G. Lawes, and his wife, who had devoted twenty years of their life to mission work among Papuans, and had not yet tired of their task. Mr. Lawes was on a lecturing tour through Australia, with a view to arousing, by the accounts of his own and his companions' doings, an increased interest in and further support for mission work. I assisted at one

of his lectures in the Rockhampton School of Arts, and was very glad to make the acquaintance of this noble philanthropist.

From Rockhampton a railway line of nearly 600 miles leads in a straight western direction, deep into the heart of Queensland, until it ends at Langreach. Twenty-six miles south-south-west of Rockhampton lies the famous Mount Morgan gold mine, believed to be the most valuable and promising mining property in Australia, and one of the richest of the world. Curiously enough, up to this day the traffic between Mount Morgan and Rockhampton is effected by post only and not by train.

Gold occurs here in a formation in which it has nowhere else been found, being enclosed in ironstone and silicious sinter, probably a deposit of a hot spring or geyser, now extinct. By the chlorides it contained, this spring must have dissolved the auriferous ironstone, and thereupon collected the gold thus set free in a reef 600 feet long and 300 feet wide, but of unknown depth. The Queensland geologist, Mr. Robert L. Jack, believes the layer to be Tertiary, and more recent than the so-called desert sandstone.

The Mount Morgan gold is of unparalleled richness (assaying 99.7 per cent), and has been extracted from the stone at from 3-12 ounces to the ton, a most extraordinary yield, if one considers that rock yielding only 1 ounce to the ton is worth digging. It is estimated that there are still more than 1,000,000 tons of ore available for working, from which gold to the value of £20,000,000 is expected.

The first possessor of the mine sold it for £640. Later a company was floated with a capital of £1,000,000 in one million shares at £1 each. These shares rose rapidly to a fabulous height, and then rapidly fell in price, but they still sold at £6 a piece at the time of my stay, and the mine has now ten-thousandfold the value of the price paid for it to its first possessor. Such is generally the case with Australian mines, except those which yield alluvial gold. They are not the prospectors and original workers of the mine who draw the true profit out of it, but the speculators and founders of companies.

On the left bank of the Fitzroy, about 3 miles from Rockhampton, are the extensive establishments of the Central Queensland Meat Export Company. "Meat Companies" of this kind are perhaps destined to play an important part not only in the history of Australia, but perhaps of the entire world, by constituting the exportation of meat an extensive and important factor in the political economy of the old continents.

For many years Australia has produced far more cattle than it is able to consume. The wide bush furnishes an almost unlimited pasture-ground for the herds, and except during prolonged drought they find ample food all the year through. No shepherd is necessary to guard them, no stables to protect them from cold, no artificial feeding during the winter. A dozen stockmen will suffice to manage a herd of 20,000 cattle. The nature of the management, the mustering, selecting, camp-drafting, and travelling with big herds of cattle, I have already described, but simpler than this is the treatment of the sheep, which are enclosed in great paddocks, and there left almost entirely to their own devices till the time for shearing arrives.

It is therefore no wonder that the Australian stock has greatly increased, and the value of the animals has consequently gone down. Queensland, with its half million inhabitants, possesses many millions of cattle, and although every poor labourer there can daily eat as much meat as he desires, there still remains a very considerable surplus of production. Exportation into the other populous colonies is not of much avail, they themselves producing more than they can utilise, and thus it is that in Queensland a full-grown, fat piece of cattle has an average value of but 30s., while at the butcher's a sheep will sometimes fetch no more than a shilling. Still one cannot speak of over-production with regard to sheep, since their principal produce, wool, is easy to transport.

The export of living cattle to Europe is at present much too expensive and precarious a matter to be seriously taken into account in the disposal of the Australian over-production, nor do I believe the exportation of tinned meat has a great future, as the high temperatures employed for preserving change the character of the meat too much. And this becomes too evident when one, accustomed to eat tinned meat here and there at some picnic, or on an Alpine tour, having to live on it for months together has experienced how insupportable it becomes in time. The texture of the meat loses its natural consistency, and at the same time its original taste, so that it is hardly possible to distinguish beef from mutton. Only tongues seem to be an exception, since they keep their consistency, and do not undergo too great a change by this treatment. Vegetables, and particularly fruit, do not lose so much by being tinned, as every housewife knows, and as all of us have already experienced.

I think that the freezing of meat is likely to have a far greater future than its sterilisation at high temperatures and enclosure in tins. By the former method it is possible to keep the meat fresh for

months without changing its character in the least, precaution being only necessary to prevent its being too rapidly thawed. Preserved meat of this kind has been imported to England in great quantities, but even now it there encounters a certain prejudice. It must indeed be owned that the meat of the Australian cattle, living and grazing in the bush, cannot be compared to English and German beef, the product of animals carefully fattened on rich meadows. Still, frozen Australian meat is probably destined to become an important article of human food in Europe, unless the fear of its becoming too powerful a rival for European cattle should induce the Governments to check its importation by high protective dues.

New Zealand was the first country to export frozen meat. Then followed Queensland, with the meat-works of Rockhampton and Normanton on the Gulf of Carpentaria, while some years ago similar "works" were founded at Brisbane.

Near Rockhampton the river is crossed by a fine bridge, which, in spite of its six powerful piers, has been several times during flood in great danger of being torn away. Thence the meat-works are reached in three-quarters of an hour, their neighbourhood being announced by perfumes of questionable quality. My wish to look over the establishment was most kindly granted, and I was much interested in becoming acquainted with its management.

In consideration of the fact that the European market has yet to be opened to this article, the establishment is kept within moderate bounds. Still, it disposes of 300 head of cattle and 2000 sheep a day, and preserves them in tins, while the freezing-works can despatch about 100 cattle and 700 sheep a day.

The cattle are killed by a thrust with a lance from above into the neck, which, by hitting the hindmost part of the brain, the medulla oblongata, occasions instantaneous death. Thereupon the animals are immediately skinned, their fat cut out and put into casks, the meat, if destined to be tinned, is scalded, enclosed in tins, boiled by steam, and finally soldered up. The tins are manufactured on the spot in a special workshop, as are the casks for those portions of the meat which, salted and barrelled, form an important food for seamen, which I myself much prefer to the tinned article. Boards are imported from Maryborough for making the casks in which the tins are exported, and the skins, horns, and bones of the butchered animals are sold.

The freezing-works consist of chambers with thick stone walls into which the icy air is driven by machines. The apparatus in which the air is cooled was not shown to me, nor was I enlightened

as to the method employed. The entrance into those chambers, the temperature of which is far below freezing-point, while their walls and ceiling are covered by an icy crust, make a peculiar impression on one freshly arrived from the tropical north of New Guinea, and a similar shock to the nerves is experienced on passing from those icy rooms into the burning Queensland sun.

The pieces of meat remain in those chambers till they are thoroughly frozen. They are then put on board the steamers anchored before the meat-works, which are furnished with a special machinery to keep the temperature of the store-rooms below freezing-point all the way to Europe. If these machines fail for some days during the voyage, a misfortune which has happened several times, the whole cargo is irretrievably lost.

The rest of the voyage, from Rockhampton northwards to the northern point of Australia, does not lead through the open sea, but through a channel-shaped arm of it running between the coast of the continent and the Great Barrier Reef. This voyage is particularly pleasant and interesting. Within the channel the sea is always calm, and the ship floats along softly and steadily. You mostly keep in view of the rocky coast, and in the narrower parts you see the slender band of the celebrated reef, alongside which the vessel passes, and which it sometimes approaches so closely that you are enabled to study many details of its formation. Formerly the passage through the Reef Channel was considered particularly dangerous, it being a frequent occurrence that unknown submarine rocks and reefs tore open the hull of a ship which carelessly passed along the surface. At present the passage is well known, at all events to the pilots who undertake the steering of the ship during the eight days she takes to pass the Reef Channel—a time of rest and leisure for the captain. Still, some parts of the channel are thought so dangerous that their passage is rarely risked at night, the captains preferring to cast anchor till daybreak.

The Great Australian Barrier Reef follows the north-east coast of Australia for a distance of 1200 miles, and has not its equal in the world. It follows the coast-line, repeating its contour in a somewhat rounded shape. Its beginning is reckoned from the Swain Reef opposite Keppel Bay, where the channel is designated as Capricorn Channel. The Swain Reefs, which do not yet bear the genuine character of barrier reefs, are situated about 142 miles from the coast. Soon, however, the channel grows narrower, and in some of its northern parts it is not broader than 5-15 miles. Frequently the reef is broken by openings communicating between the channel

and the ocean beyond. Some are quite narrow, others have a breadth of 12 miles or thereabouts. These wider openings are always found opposite the mouths of rivers, fresh water being very detrimental to the growth of the coral animals. The largest opening is near the mouth of the Burdekin River. Near its southern extremity the reef is broken up into a number of detached pieces, the above-mentioned Swain Reefs, situated on a common sand-bank sloping down towards the east. Then follows to the north the genuine reef, varying in width from 350 yards to several miles. Between the principal barrier and the coast we find quantities of single reefs dispersed, which in some places are so dense as seriously to endanger navigation.

Generally speaking, the depth of the Reef Channel is considerable. In the north it reaches 15-30 fathoms, in the south 50-70, in some places even to 85 fathoms and more. The outer margin of the reef falls off steeply towards the ocean. Just outside the breakers the depth already amounts to from 35-110 fathoms, and farther out the bottom of the sea lies at a depth of 540 fathoms. Only at its northern and southern extreme is its slope more gradual. Here and there coral reefs and islets accompany the real Barrier Reef, most of them having the shape of atolls, and rising steeply out of a great depth.

At low water the reef is very evident, jutting some feet out of the sea as a broad and dark band. On its flat back, which is devoid of vegetation, we see blocks of black coral rock piled up in heaps—"Niggers' heads," as Flinders calls them. The portion of the reef which shows above the water, with the numerous islets belonging to it, is estimated to cover an area of 30,000 square miles, which, except for some few woody islands, is entirely sterile and uninhabitable. Still it offers a product of considerable value. Among the millions of animals peopling those parts of the reef which are covered by the sea during high water, there abound certain species of Holothurians, relatives of the sea-urchins and starfishes, some of which are eatable and furnish a delicacy much favoured by the Chinese—the tripang or *bêche-de-mer*. The Great Barrier Reef is one of the richest tripang grounds existing, and is continually ransacked by a lot of white fishermen from Thursday Island, Cooktown, and other North Australian settlements. I shall recur to the tripang fisheries on Thursday Island later on.

What, now, is the origin of this wonderful barrier? It is easy to observe that it is a production of the reef-building coral animals. But what can have induced them to erect their edifice, not close to

the coast as usually, but at some distance from it, though strictly following its course? We find barrier reefs in several other parts of the tropical oceans, none, however, of an extent similar to that of the Great Australian Reef. It might be presumed that some kinds of coral prefer to build close to the coast others at some distance from it; but this, however, is not the case. We see the same species of animal build coast reefs in one place, barrier reefs in another, wherefore it would appear that the position of the reef is due to outside circumstances.

An explanation of this wonderful phenomenon, applicable to the majority of cases, has been given more than sixty years ago by Darwin, who, on his voyage round the world, had occasion to investigate the reef formations within a large part of the globe. Let us imagine a coast closely bordered by a reef, and let us further imagine that from some physical reason this coast should begin to subside, or, what would effect the same result, that the surface of the sea should rise. If this subsidence took place gradually, as is mostly the case, the corals might raise their structure in proportion to the gradual sinking of the coast or rising of the surface, and this they are forced to do, as most kinds of reef-building corals are wont to live in shallow water, thriving best in a depth up to 25 fathoms—a depth of 60 fathoms being regarded as the utmost limit for the growth of reef-building corals. Now let us imagine a sloping coast in a state of subsidence. The longer this subsidence of the coast (or the rise of the water-surface) continues, the greater will become the distance between the outer edge of the growing reef and the coast-line of the mainland. This intervening space, however, is not filled up by coral structures. They thrive only on its outer margin, where the open sea breaks powerfully against the rock, as the coral polyp needs the surf and its ceaseless circulation of water. It is for this reason that growth of coral takes place only on the outer edge, and it is thus that we explain the origin of the reef channel, which is nothing but a shallow area between the coast and the living reef. If the coast in question be long-stretched like that of North-East Australia, the consequence will be a long-stretched barrier reef with a corresponding reef channel. If the land in question be an *island*, a ring-shaped reef will arise. If, as is frequently the case, the central part of the island subside entirely, the circular reef channel will form a round lagoon, bordered by coral rocks. Reefs of this sort, encircling a central lagoon, are called "atolls." We find a great quantity of them in certain parts of the tropical seas, particularly in the Pacific and Indian Oceans, and

their singular shape has always excited the attention of mariners. Darwin's hypothesis, which has been accepted by the well-known American geologist, Dana, and confirmed by him with new observations, seems to furnish an equally simple and exhaustive explanation of these peculiar barrier and atoll formations. Recently, however, his theory has been challenged on various sides, and there exist a number of alternative explanations. The later investigators, Semper, Murray, Guppy, and others, strive to explain the formation of barrier reefs and atolls *without* supposing a sinking of the ground or a rising of the ocean surface. The channel of the Barrier Reef and the lagoons of the atolls are said to originate from an erosion of the coral rock, and from a washing off of the loosened fragments and sediments by currents. I am not able in these pages to consider that complex matter. It is certain that many reef formations, superficially reminding of atolls and barrier-reefs, owe their existence to other circumstances than those brought forward by Darwin and Dana. But never can I believe that the channel of the Great Australian Reef, in all its width, its depth, and with its tranquil waters, is a mere product of the erosion and washing out of the inner parts of a coast reef, and that the process should have extended over this immense area of 1200 miles with its characteristic uniformity. Very plain, however, is the explanation of this structure, its steep, outward decline, and its broad and deep channel, if we suppose a gradual sinking of the north-eastern coast of Australia, which still continues with passing interruption by a stationary phase, for it is certain that an essential rising of the Queensland coast cannot be proved during any more recent period.

Personally, I think Darwin's explanation applicable not only to the Great Australian Reef but to many other reefs and atolls, and all typical formations of this kind, though it must be owned that in some cases a chance configuration of the basis on which the corals work can produce a similar structure, and that erosion of the dead parts of a reef, which have stopped growing, may play a part in the formation of some lagoons. Darwin may, perhaps, have applied his generalisation too widely, but a far greater mistake, however, is that of his critics and adversaries, who absolutely refuse to accept his valuable hypothesis, because it does not suit some few cases, and because its great originator has thus applied it somewhat too liberally.

Between Mackay and Bowen, two little towns of a completely tropical character, which in spite of extensive sugar plantations, and the existence of gold, silver, copper, and tin mines in their neigh-

bourhood do not appear to flourish, the landscape is of great charm and picturesqueness. Though still very broad in this place, the channel is nearly filled up by a quantity of closely-strewn islets and reefs; and in Whitsunday Passage the great vessel slowly floats along among a maze of densely-wooded islands which rise steeply out of the water, always in sight of the proudly-shaped mountainous coast of the Continent. While the steamer makes its way through the narrow passage, one island after another, each clad in tropical green, rises above the ocean, so close to you that you not only admire the graceful outline of its heights, but fancy you are able to grasp its trees and plants. It is like a voyage through fairyland, every turn of the ship conjuring up a new and charming picture. Equally beautiful is the passage through the narrow Hinchinbrook Channel, between Townsville and Cairns, farther north.

Townsville, the future capital of North Queensland, and at present her most important harbour, lies near a flat, longish bay, opposite the granitic "Magnetic Island." The town lacks the advantage of a large river, the stately Burdekin flowing into the sea at some distance to the south. The harbour is of moderate quality. Our faithful companion, the Australian Cordillera, has here quite closely approached the coast, and the town lies at the foot of its mighty range, the bare masses of which fall steeply off towards the sea, presenting us with a good view of their reddish-brown sides.

The rock is a granite, owing its peculiar colouring to the circumstance that the felspar is dyed a reddish-brown by iron oxide. The highest summit of the range is Mount Elliot (4000 feet), and immediately above the town, steep Castle Hill rises to a height of 1000 feet. The characters of all these young Queensland townships are somewhat monotonous, except in the differences of their natural situation. Finer public buildings and more elegant shops in the bigger towns, a more tropical character in the northern ones, are the principal differences which strike our observation. A certain method has been established, according to which new towns are built. The post, the municipal buildings, schools, and banks are erected according to the same sufficiently tested plan. Till now, it was not considered worth while to employ an artistic or original design on these edifices. Nevertheless, Townsville, with its fine Flinders Street, is a bright and agreeable, though somewhat dusty, town. It is not only the harbour for the immense pastoral territory stretching west of Townsville to the Diamantina River, the products of which, wool and meat, are here shipped, but also the port for several gold-fields belonging to the richest in Australia. Eighty-two miles west

of Townsville lies Charters Towers, next Mount Morgan and Gympie, the most considerable Australian mining-town. A railroad leads from Townsville to Charters Towers, and thence inland as far as Hughenden. Everywhere in this neighbourhood the granite and metamorphic rocks are blended with metals, particularly gold, and this rich district extends from the Burdekin River in an almost uninterrupted line to the north to the very heart of York Peninsula.

North of Townsville the north-east coast does not present any townships of importance, but only some young and rising settlements, serving the exportation of the products of this promising but yet partly undisclosed country. Besides metals, sugar is the chief object of exportation in these northern districts; and from Maryborough to York Peninsula the occurrence of sugar-plantations, accompanying the lower river-courses, becomes more and more frequent. For want of other cargo, the ships bring from the north quantities of bananas, pine-apples, mangoes, and papajas. Thus Sydney—which receives from the north these tropical fruits, and from the temperate New Zealand and Tasmania, apples, pears, plums, and cherries, while New South Wales and South Queensland furnish it with grapes, peaches, strawberries, oranges, melons, and passion-fruit—is a real paradise in the way of fruit, combining the fresh productions of the tropics and the temperate zone.

Now our ship continued her course close to the coast through the narrow Hinchinbrook Channel between Townsville and Cairns. Here the mountainous and wooded coast district is almost uncolonised, and the savage native reigns supreme, roaming from place to place free and untrammelled, and coming rarely into contact with the whites. This is the territory explored by Kennedy in 1848 amid indescribable dangers and hardships, till he and most of his companions fell victims to the blacks in the neighbourhood of Cape York. Kennedy's black servant, faithful and courageous "Jacky," was the only one to reach the settlement "Port Albany," and to effect the rescue of the two white men who alone survived the expedition. They were found at Weymouth Bay, where they were offering a last desperate resistance to the attacks of the natives of that neighbourhood.

A more considerable settlement of the north coast is Cairns, situated on a wide crescent-shaped bay, bordered by a high and wooded mountain range. Here the granitic Bellenden Ker, one of the main summits of the Cordilleras, rises once more to the height of 5400 feet. A railway line runs a short way into the mountains,

opening a vista into scenery of indescribable beauty; massive walls of rock, entirely overspun with the densest tropical vegetation and wild-pouring torrents, like Stoney Creek and Barron River, descending into the depths with thundering sound. Farther north we approach Port Douglas, and having doubled Cape Tribulation we finally arrive at Cooktown.

In June 1892 I stayed for four weeks in the neighbourhood of Cooktown to get acquainted with tropical Queensland and to study its fauna.

The name of this town is derived from the celebrated mariner and discoverer, James Cook, whose ship *Endeavour*, on his first grand voyage in 1770, ran upon a reef north of the present Endeavour Reef, when he had to throw his guns overboard to get free. He then landed in the Endeavour River to repair the leak his vessel had received, and remained in those parts for nearly two months, till at last, on 13th August 1770, he succeeded in passing through the Barrier Reef. A fine column of granite in the principal street of Cooktown bears the inscription—"In memoriam, Captain Cook, who landed here June 17th, 1770—Post cineres gloria venit"; thus reminding us of this memorable incident of Captain Cook's journey. It was the most successful voyage of that great man, and he the first to explore and determine the east coast of the Australian continent. Cook's guns have been eagerly dredged for, though till now without success.

Cooktown is the centre of a district excessively rich in minerals. It principally yields gold and tin, and besides this silver and antimony. Sugar, rice, and tobacco thrive likewise. The good harbour of Cooktown is the natural port for the commerce with British New Guinea. Still this township cannot boast a real progress, and at the time of my visit it was in a state of utter economic depression. The highest rise Cooktown has yet attained was in 1873, when very rich alluvial gold-fields were discovered on the Palmer River, 120 miles inland to the west. During the first four and a half years they yielded gold to the value of £4,000,000. The yield of 1875 alone made up £1,000,000. Not only Australia, but Europe, and particularly China, sent out crowds of gold diggers to the Palmer, who at one time were said to exceed 40,000. Soon, however, the mine was exhausted, the yield grew less prosperous from year to year, and it is now hardly worth mentioning, and the digging population scattered with the same rapidity with which it had gathered. A railroad which was being built from Cooktown to Maytown on the Palmer does not reach any farther than the station Laura, about

60 miles inland. Whether the line will ever be terminated seems more than doubtful. Cooktown itself has at present but 2600 inhabitants; Maytown, on the Palmer, no more than 135, or, if we include the surroundings, 858; Palmerville, once a prosperous settlement on the Palmer, is quite deserted, and already in 1886 only contained 25 inhabitants, mostly Chinamen.

The great "rush" for gold, which in 1873 caused the increase of the population in the Cook district, has introduced more Chinese into this part of Australia than into the south parts of Queensland and the other colonies. A scattering of them may indeed be found anywhere, as well in the big towns as in the country. In Cooktown, however, they make up 10 per cent of the population, and they do not disappear in the mass of the people as they do farther south. Here we find them represented by a number of well-to-do tradesmen, planters, and speculators, and during my stay the initiation of their Joss House was celebrated with any amount of pomp and rejoicing. In its gaudy and fantastic hall three horribly ugly idols had been put up, and were presented with all kinds of boiled and unboiled food by most solemn-looking Chinamen, who accompanied the act with the queerest bows and compliments. During this ceremony there was a continual hissing and clattering of strong-smelling fireworks on the place adjoining the house. This went on from morning till night; still after all the three gods were cheated of their food, which, as I well observed, disappeared between the teeth of their worshippers, who kindly relieved them from the trouble of digesting it.

The habits of the Chinese are excessively unsympathetic to the Australians, and their rivalry in commercial matters is found most inconvenient. Also the cheapness of Chinese labour is a thorn in the flesh of the Australian workmen. Added to this, the Chinese are no colonists in the true sense of the word. They continue to regard China as their true home, whereas Australia in their eyes serves but as a convenient means of enrichment by labour and ingenuity. They do not let their wives accompany them, but as soon as they have, by industry and thrift, scraped together a certain sum of money they are off with it to China, letting younger countrymen take their place to gather riches in the same approved fashion. Taking into account that the Chinese, wherever they go, are perpetrators of a hideous immorality, and of the fearful vice of opium-eating, we cannot be surprised at the Australians trying to guard themselves against such visitors. A good expedient has been found in the introduction of an immigration-tax up to £20 a head, which

prevents the poorer Chinese, who naturally form the bulk of immigrants, from crowding into the country. The remaining ones will in time disappear by themselves, according to their custom of returning, after a certain time, to their mother-country. Thus Australia will soon be rid of this invasion. The loss of them, however, especially as flower and vegetable gardeners, will be felt for some time, the Australians not deigning to occupy themselves with these modest professions which they have for many years ceded to poor "John Chinaman."

Cooktown is beautifully situated at the foot of a granitic range, the densely-wooded Mount Cook (1500 feet high). On the north side of the town lies "Grassy Hill," with a signal station on its summit. The whole coast of this district presents a rugged and mountainous aspect. It consists of a much interrupted area of sandstone, crossed and broken by granitic ranges. The sandstone is permo-carboniferous, and probably belongs to the so-called Gympie formation, which extends over a great area farther south in the district of the Burnett, Mary, and Fitzroy-Dawson. In different parts of this district coal-fields of great prospective value have been found, which will prove of more importance to Cooktown than the deceptive gold, and a company has already been floated for working the mines.

I established myself in the well-kept Great Northern Hotel, depositing my extensive baggage in the "sample-room" of the house. Beside my private luggage I had an amount of camping, fishing, and hunting tools, glass and iron-plate vessels for my collections, chemicals, and great quantities of alcohol for the preservation of animals. The "sample-room" is a common feature of all North Australian hotels. It serves the commercial travellers for the exhibition of their extensive stock of samples, which are here inspected by shopkeepers and private persons. The institution of travelling-clerks is, of course, very useful and of vital necessity for the communication between these distant coast-towns and the centres of commerce many thousand miles away to the south. The sample-rooms came very handy to me here as well as in Thursday Island, and at both places I converted the temple of Mercury into a sanctuary of Minerva, by making it my laboratory.

In Cooktown lives a German physician of great renown in these parts, whom the German Government has appointed Vice-Consul of Queensland. His name is Dr. A. H. F. B. Kortüm. He has been an inhabitant of Queensland for twenty years, where after having finished his studies at the Leipzig University, he opened a lucrative

practice on the Palmer gold-fields. When later on the gold began to wane, and gold-diggers and patients grew scarce, he settled in Cooktown, and has since been known to all Germans visiting Queensland as a most amiable and obliging countryman.

To Dr. Kortüm I am indebted for another German as a helper in my hunting excursions in the bush, Harry Asmus, an old inhabitant of North Queensland like himself. Born in Schleswig-Holstein, he had taken part in the campaign of 1870-71, and had fought in the battles of Gravelotte, Bapaume, Amiens, and St. Quentin. In 1872 he had emigrated to Australia, had married, and had been living for many years on his small farm near the railroad leading from Cooktown to Laura, the station being named after him Asmus Station. He had tried his luck at all sorts of trades, as gold-digger, hunter, farmer, and bee-keeper, showing cleverness and skill in each of these occupations. Still one cannot say that he really prospered, that "piece of good luck" failing him which is so welcome everywhere, but doubly necessary in countries which do not offer the beaten track of our civilised careers. Just now he had sold his share in a gold-mine for a farthing. He had discovered the mine himself some years ago with three others, and had worked it with them till now. His three mates, who were closely related, anxious to push him out of the enterprise and to continue it quite *en famille*, had up to that time refused to advance the capital necessary for a profitable working of the mine. Now, however, after having removed their unwelcome companion, they put their money into the bargain more liberally, thus giving the business a better chance to thrive. Asmus, though he thought the enterprise promising, seemed altogether glad to be out of it, the ineffectual way in which the work had hitherto been carried on and the malice of his companions having too sorely tried his patience.

The engagement of Asmus was just such a piece of good fortune as that of Dahlke for my Burnett work. It would have been impossible to find a more sober, skilful, and diligent companion. Besides he was a man who had seen something of the world, who possessed a sound judgment and agreeable personal qualities. I also engaged his younger brother Julius, a lad of twenty, who, as I later remarked, was one of those Australians who are ashamed of their German origin, disown their mother-tongue, and want to be considered as Australians only. I have always told such people that, having never before had any reason to be ashamed of my German nationality, I felt that there was indeed a reason for this feeling in the face of individuals of their kind. Harry Asmus

undertook to procure me a horse, and I engaged a dray and team, the proprietor of which, Frank Phillips, entered my service as cook and surveyor of the luggage and the camping affairs.

It was my intention during my month's stay in the Cooktown region to give my principal attention to mammalia, to collect material for the development of kangaroos, and to obtain one or two specimens of the singular and very rare Queensland tree-kangaroo. According to what I was told, kangaroos in large numbers were to be found due west from Cooktown, in the mountains between Endeavour River and Oaky Creek, a tributary of the Annan. I immediately repaired to that place, taking with me but a small part of my luggage, and after two days I found myself comfortably established in my camp and ready to start my hunting life. Our camp was on a plain at the foot of Oaky Creek Range. These plains and sloping hills bear the same character as the Burnett country so well known to me, that of an open gum-tree bush. There is but one difference, that wherever a water-course interrupts the landscape its borders are fringed with a narrow strip of tropical vegetation, the chief elements of which are palms, pandanus, and ficus. The occurrence of woods in close proximity to a water-course is also found elsewhere. Peculiar to this region is the sharp difference in the vegetation, which is particularly striking where, as near these insignificant creeks, the seam of tropical vegetation is only a few yards broad and sharply defined on its outer edge. Here and there, where the ground happens to be damp or swampy, scrubs of a tropical character are interspersed among the bush, and the summits of the higher mountains, frequently moistened by rain and fogs, offer a rich tropical vegetation.

In these plains and the slightly rugged regions big herds of kangaroo may yet be found. These animals will always hold their own as the most characteristic feature of Australia. Every one who has observed them in zoological gardens and menageries will have remarked that there exist bigger and smaller kinds of this animal, but we are apt to lose sight of the many and considerable differences between the various species and genera, in the simple fact that the general quaintness of their aspect, the peculiar structure of their extremities and tail, and the queer manner of their locomotion, lead us to overlook everything else. Nevertheless these animals, apparently so uniform in structure, show an astonishing variety in their more minute features, their habits, and their distribution. If we reckon only the genuine Macropodidae without the kangaroo-rats, we have to admit seven genera comprising forty-three species, and of

these twenty-three belong to the genus *Macropus*, the real kangaroo. The Australian colonists call all the larger kinds "kangaroos," and only designate one big, heavy, and nearly black species peculiar to mountainous districts (*Macropus robustus*) as "Wallaroo." The smaller kinds they call "Wallabies," and they only distinguish them from each other by adding an adjective descriptive of their colour, their fur, or the nature of their haunts. Besides the wallaroo, there is but one other genus peculiar to the mountainous country: the *Petrogale*, called "Rock-wallaby" by the settlers from its cleverness in climbing rocks. When driven to bay by persecuting dogs, these animals sometimes climb slanting trees, and are therefore confounded with the real tree-kangaroo, *Dendrolagus*, a very different animal. Other kinds of wallabies live in scrubs, but the *Macropodidae* for the most part prefer the open bush, the level or undulating ground of which gives them occasion to exercise their splendid leaping powers, besides offering them a rich pasture. The leaps of the bigger kinds have generally a length of several yards. When chased they heighten the extent of a single leap to ten yards or more. The jerk is produced by the hind-legs without assistance from the tail, as some think. This is easily proved by observing the track the animal's leaps imprint upon the ground. The tail is flourished at every leap but hardly touches the earth. It seems to help the leaping animal to steer and to support its weight when resting.

Inland from Cooktown there are still great quantities of kangaroos. In the more populous south their numbers, particularly those of the bigger kinds, are considerably thinned, not because they retreat before the advance of man, or because the natural conditions of their existence are changed, but because they are systematically exterminated. The squatters regard them as competitors with their cattle, and it must be owned that their attacks upon the scanty pastures may in times of drought be very unwelcome. For this reason the Government have at different times offered a capitation fee of 3d. or 6d. a scalp, thereby greatly contributing to the extermination of the interesting and harmless creature, while hundreds have often been shot on grand drives, and their bodies left to rot unheeded. More recently kangaroo skin has been found to furnish a particularly soft leather, and this discovery gave the animals a sudden value, and since that time numbers of people have gained their livelihood by shooting kangaroos. They wander all over the districts inhabited by greater kangaroo herds, stalk their game, and kill the big and full-grown males by a well-aimed rifle-shot. For a big and faultless kangaroo skin a prize of 18s. is paid. A sport

favoured all over Australia is the kangaroo-hunt on horseback. In a mountainous region this kind of chase is misplaced, the game overleaping obstacles, dales, and gullies, which the horses and dogs must either avoid or climb over. On level ground, however, a good horse and a good dog will soon catch up the kangaroo in spite of its enormous leaps, four legs having an advantage over two in carrying along a heavy body. Then the poor creature, driven to bay, will seek its last refuge by leaning its back against a tree and defending itself against its pursuers by kicking and scratching with its hind legs, the fourth toe of which bears a long and pointed claw. On carelessly approaching an old kangaroo male bent on his defence, dogs will often be clutched by his forelegs, suffocated by his powerful embrace, or scratched to death. A man, however, who attacks the animal with a good strong stick can easily kill it. Some kangaroos, when at their wits' end, sometimes manage to escape into a river or lagoon, in the deep water of which they stand fully erect and drown any dog swimming up to them.

For kangaroo-hunting Australians use a cross-breed between a greyhound and mastiff, so-called kangaroo dogs, which unite swiftness with courage and vigour.

In the plains round Cooktown, between Oaky Creek and Endeavour, I found kangaroos still abundant, particularly the gigantic red kangaroo, *Macropus rufus*, which lived there in numerous herds, the largest of which numbered more than a hundred animals.

On these shooting expeditions my rifle proved very useful. I stalked up to the herd to small-shot distance, shot one of the sitting animals, and then fired a ball into the flying herd. When it was impossible to come upon them so closely, I shot an express cartridge at them from a distance. The worst of the matter was that our continued persecution soon rendered the animals shy and wary, so that, after some time, it became very difficult to approach them. The big herd aforementioned soon grew entirely unapproachable, one or other of the beasts being sure to remark our presence, whereupon it took the whole party along with it.

Like our stags and roe-deer, the kangaroos prefer to keep hidden in retired and sheltered spots during daytime, only coming out to graze when darkness sets in. How often in my camp have I heard the heavy, rhythmical tap produced by their hind legs on the ground! This noise is as characteristic of the Australian bush as the mad

laughter of the laughing-jackass, or the charming tune of the flute-bird.

Where kangaroos are hunted for the sake of their skin, strong males are chosen and shot with the ball. But as I laid more store on the juvenile stages of development than on the undamaged skins, I shot only full-grown females, employing small-shot as well as balls. The females are easily discernible, as their skin is not reddish like that of the males but rather of a bluish-gray. The season, however, was not propitious for my collections, all the females I shot having already a pretty large young one in the pouch. When sharply

Red Giant-Kangaroo (*Macropus rufus*).

pursued the kangaroo commits the same unmotherly act as the kangaroo-rat. She lets the young one slip out of her pouch, sacrificing her offspring the better to escape her pursuers, whereby it would appear that the instincts conducive to the care of the young are less developed in these lower mammals than in the higher and in birds, where the mother is generally quite ready to sacrifice her own life in the interest of her progeny.

The muscular tail of the kangaroo furnishes a delicious soup, and its flesh is not to be despised. In general, the Australian settlers do not care very much for kangaroo meat, and think themselves sorely neglected by fate if forced to live upon it for some time, and to go without their beloved beef. The kangaroos killed by ourselves, which, when skinned, were left lying about near our

camp, were disposed of by a great number of falcons, which assembled round their remains like vultures. Real vultures are wanting in Australia, and instead of them some eagles and falcons fulfil the office of carrion-eaters. This at least is the case in the coast districts, but in the inland country, so far as I have observed on the Burnett, the fallen cattle and dead game are left to rot unheeded by any other animal.

As I did not care much for the later stages of kangaroo development, I resolved to repair to surroundings which would offer me game better suited to my purposes. Before doing so, however, I undertook an excursion to a scrub situated at the foot of Mount Fantastic, north of the Endeavour River. In my last camp I had noticed every evening, on setting in of darkness, enormous frugivorous bats, so-called flying-foxes, members of the family of Pteropidae. They used to dart about in the air above our heads, and I fetched down some of them by small-shot. These bats always approached one by one, though sometimes a number of them came from the same quarter. According to Asmus, our visitors were members of a "flying-fox camp," a place serving as day-quarters to a party of these animals, whence they start at night in search of their food, which consists of fruit of all kinds, though they do not despise meat, fish, insects, and birds' eggs, when such come within reach. Asmus told me that he knew a flying-fox camp quite near; and never having seen the like, and expecting good scientific material from my visit, I rode to the place with him, leaving the other two to take care of the camp. On our ride we had to cross the Endeavour River, where we saw at some distance two pretty big crocodiles lying on the bank. They were two specimens of *Crocodilus porosus* (*biporcatus*), very frequent in the river estuaries and on the coasts of North Australia, New Guinea, and the Malayan Islands, south-west China, and the east coast of India. They are even found at the Solomon Isles and at Fiji. It seems that these crocodiles do not go any higher up the rivers, but prefer their estuaries and the coast. They attain a length of 25 feet and more, and are dangerous robbers which seize big game, such as calves, sheep, and human beings who approach the waterside, drawing them into the deep, there to devour them. They attack their victims from the water, where they hide in a deep place on the look-out for game. If, however, a party of several people approach the water, making a noise or disturbance of some sort, the crocodile at once loses courage and takes to flight, and I have never heard of its grasping an individual out of a large group. A lonely

woman, however, coming to fetch water, a man fishing in his canoe or on the river-bank, is sure to attract its attention, and so sudden is its attack, so sure its grip, that the victim has hardly any chance to escape. Only the larger specimens, however, and among these only the most courageous, will attack man. It is the same as with tigers, only a small number are man-eaters. Those, however, which have once had the daring, become bolder and bolder, and a single animal will often endanger a neighbourhood for a long time together. Dr. Kortüm showed me the head of one of these mailed giants. It measured more than 3 feet, and belonged to a crocodile which had for a long time beleaguered the Endeavour River in the neighbourhood of his farm, and had caused the disappearance of many a calf and other domestic animal, and also of some harmless Chinamen. At the same time this animal was so sly and wary that it was impossible to kill it by shooting, and it had to be poisoned by strychnine. It is said to have measured 24 feet in length, and I was told that a Chinaman's pigtail was found reposing in its stomach. I do not dare, however, to answer for the truth of this assertion.

The flying-fox camp was situated in a dense scrub of about a square mile in extent, near the station of a Mr. Webb, a former mate of Harry Asmus. The master of the house was not present; its mistress, however, welcomed us most kindly. Before the house stood a cage, the inhabitant of which was a fine long-tailed green parrot with splendid wings of scarlet, probably of the *Ptilinopus* species. On top of the cage sat another bird, similar to the first but more uniformly green of hue, which flew away on my approach. Mrs. Webb told me that the inhabitant of the cage had, a few months ago, been wounded in the wing by her husband, in the neighbourhood of the house, and being quite sound otherwise, had been brought there by his captor. Every morning since that time his faithful little wife would come to see him, and to keep him company for a few hours. After having paid her visit she flew off, even kept away for some days together, but ever and again she came to look after her old mate. If the cage was taken into the house she did not venture to follow, and was altogether shy and afraid of all members of the family. Is this trait of faithful fondness in a bird not truly touching?

The scrub forming the haunt of the flying-foxes consisted of high forest trees, ficus, palms, and mighty gum-trees. The ground in some places was swampy, and once I sank into the mire up to my knee. In the foliage of this wood the flying-foxes hang suspended by thousands.

They are not dispersed all over the wood, but prefer certain places and trees, where they hang in dense clusters from the uppermost branches, close to and above each other, taking their day's rest. Still it would be wrong to believe that absolute silence and tranquillity reign in this open-air dormitory. Some of the animals are always awake, disengaging themselves from the mass, exchanging their place for another one, screaming and screeching, so that the presence of the flying-foxes makes itself heard at a considerable distance. Our noses also gave us notice of their vicinity, their acrid, fox-like odour being carried to a distance of several miles by the wind. On the ground, beneath the trees on which they sleep, we find heaps of torn-off leaves and twigs and large mounds of dung. Above the scrub a quantity of mighty eagles, *Aquila audax*, may be observed, floating upon the air to choose their victims among the flying-foxes who happen to venture out of the sheltering foliage.

I fired into the midst of the heap, thinking that my shot would bring down dozens of animals. How astonished was I to see only two fall, as the wounded animals tighten their grip of the branches, and even the killed are often kept suspended by the denseness of the group, which prevents their falling to the ground. Only a few of them flew away, attaching themselves to other branches after a short flight. Our gun-fire regularly occasioned a dreadful confusion, shrill and violent screams were heard, and the ghastly figures of these harmless "vampires" were seen flying to and fro among the foliage in an anxious and excited fashion. Fifty of our shot killed sixty animals, among these only twenty females, a number of which were in cub. I was glad when our cartridges were exhausted and this murdering came to an end. The slaughter of such helpless creatures is disgusting, even to one who undertakes it for a scientific purpose, and particularly so when some of the wounded animals are not even obtained, but left to die a slow and miserable death.

Mrs. Webb told me that this great assembly of flying-foxes takes place every year at certain periods, and that most of the animals repair to other quarters after a sojourn of about four months, only their young ones remaining behind. According to this statement the camps would be real breeding-places, from which the animals depart when their rutting-time is past, be it that they separate totally or divide into smaller parties. This explanation of the Pteropine camps has not, to my knowledge, been given by any other observer, but I myself do not regard it as definite, not having made the observations with my own eyes.

After returning to my own camp, I got everything ready for starting. My first goal was Cooktown, where Asmus and I were going to make inquiries as to the presence of tree-kangaroos in the surrounding mountain-woods. The existence of this peculiar genus on the Australian continent, and principally in North Queensland, was first recorded eleven years ago by the Norwegian

Tree-Kangaroo (*Dendrolagus Lumholtzii*).

traveller, Carl Lumholtz. Till that time the genus *Dendrolagus* was believed to be limited to New Guinea, where it is represented by three species. Lumholtz found a fourth, till then unknown in the scrubs on the Herbert River. It has been called after him *Dendrolagus Lumholtzii*, and since then the existence of tree-kangaroos has been claimed for several parts of the tropical scrubs of the north-eastern coast. They all probably belong to the species *Dendrolagus Lumholtzii*, though the existence of other kinds is not impossible. It seems very singular that a creature, the structure of

which marks it out as a leaping animal adapted to life in the plains, should have accommodated itself relatively well to an arboreal life among trees and leaves, without really changing its character. It must be admitted that its movements among the trees differ somewhat from those of other tree-animals. It jumps upon a low tree at one leap, and thence ascends higher up, always moving by hops and leaps. But it can also climb the higher trees quite deftly by catching hold of the branches with the sharp claws of its forefeet and applying its hind feet tightly to the trunk. Arrived in the crown of the tree, it moves about in the same hopping manner; and I was told that it presents a very queer sight jumping about in the foliage of the native woods.

At Cooktown I heard that specimens of this animal had been lately seen in the tin-yielding mountain region at the foot of Mount Finnigan, and that near the Normanby River some were said to have been seen by tin-diggers. The statement regarding Mount Finnigan appeared to me more reliable. Besides this spot was easier to reach, so I resolved to repair thither.

I was at the time somewhat indisposed. We had suffered very much from mosquitoes in our camp, and during my sleep I had scratched my feet till they bled. The wounds on my right foot, which during our pursuit of the flying-foxes had sunk deep into some mire saturated with foul substances, had become inflamed in a disagreeable way. Soon the whole foot was swollen, and made me suffer violent pains while riding and walking. As it was impossible for me at that time to nurse my foot properly, in spite of antiseptic treatment, I was hampered for weeks by this disagreeable complaint.

It takes three days to drive from Cooktown to Mount Finnigan, and I accordingly sent my dray on before me, and started one day later on horseback with Asmus. On our way we had first to cross a handsome bridge over the Annan River, which is very broad just here and still within range of the tide. The bridge has a length of 1100 feet, and cost £17,000. It is a monument to those palmy days when gold was to be found on the high-roads. We followed the road leading from Cooktown in a southern direction to the Bloomfield River. On our way we met several troops of pack-horses, driven by one or two riders, who brought the tin washed in Bloomfield and its neighbouring districts to Cooktown. Every horse carried a load of 200 to 300 pounds of tin. The country thereabouts is too rough and mountainous to admit of transportation by carts or carriages.

We crossed several granitic mountain ranges of a wonderful and weird aspect, among others the "Black Trevethan Mountains," the steep declivities of which are almost devoid of vegetation, and the colour of the rock nearly black. Parts of it, loosened from the main body by decay, cover the slopes of those mountains like mighty ruins—a scenery as singular as it is sullen and gloomy. Then again our way led us through beautiful tropical scrubs, where pandanus and mighty palms, *Livistonia australis* and *Corypha australis*, thrive abundantly, forming woods of exquisite beauty. *Corypha australis* is called "cabbage-palm" by the colonists, and its young unfolded leaves, scalded in boiling water and then dried, furnish an excellent material for the platting of solid and useful tropical hats. Further I noticed another tree of handsome growth, attaining a height of 25 to 50 feet or even more, the foliage of which, in its vivid green, is remindful of our own forest trees. My companions, however, warned me against this, which is nothing but an immense tree-shaped nettle. It is called the Australian stinging-tree, *Laportea gigas*. The poison of this gigantic nettle, particularly of its younger leaves, is much more vicious than that of our small herbaceous nettle, so that an extensive infection from the hairs covering both sides of the leaves may cause a violent inflammation of the lymphatic vessels, and may even endanger the life of the victim. On cautiously touching a leaf with the tip of a finger, I at once felt a pain mounting right up to my arm-pit. When the poison touches one's mucous membrane, one naturally feels acutely irritated; and even a breath of wind coming to the wanderer from the vicinity of the tree will cause a fit of violent sneezing. The higher trees of this species are less dangerous than the low bushy ones, but horse and rider in passing become exposed to serious damage from their poisonous leaves. Horses are particularly liable to this irritation, and, behaving as if they had gone mad, they begin to roll about the ground, and are unfit for use many days afterwards.

There is another fiend lurking in these scrubs, a climbing palm, *Calamus australis*, called "lawyer vine" by the colonists. This plant belongs to the group of rattan palms, and climbs from tree to tree, extending its hard and elastic shoots and tendrils, armed with pointed hooks and horns, through the thicket in every direction. Woe to him who approaches it too closely! He will find himself caught as in the net of a tough and wily "lawyer." When extricated here he is caught up there, fighting a hopeless battle with the relentless vine, from the embrace of which he vainly tries to release himself. In spots abounding with this terrible plant, it is perfectly

impossible to get through the wood, unless one clears the way quite systematically with axe and knife.

Very frequent in these parts were the splendidly-coloured bee-eaters, *Merops ornatus*, long-beaked birds, the size of a thrush, but of a much slighter build. Their main colour is green, but this is enlivened in a charming way by black, reddish-brown, yellow, and blue feathers. Asmus felt hostile towards these birds, as they render the keeping of bees very difficult. On the whole, the bees have many more enemies in the tropics, and their honey is more in demand than in Europe and in temperate Australia. Besides the innumerable insect-eating birds, amongst which the bee-eaters are the worst, the plentiful spiders and wasps are a great danger to the diligent honey-seeker. Many lizards are likewise intent upon their pursuit, and the rapacious and plucky little ants are frequent visitors to their stores. Therefore bee-masters have to keep their eyes open to destroy every ant-hill and wasp-nest in the neighbourhood, and to kill off the birds lest they endanger the life of their nurslings. Asmus told me that he had never known swarms of our honey-bee to have run wild and to have existed independent of man in these tropical regions as they do on the Burnett.

On the second day we arrived at the foot of Mount Finnigan, where the roughness of the mountainous country had brought the dray to a stop, and where my men had therefore halted and raised a camp. This place was more than 600 feet above the sea, and looked rather promising. Next to us was a native forest, which subsequently yielded me many interesting objects, particularly insects. Disagreeable inmates of this and the neighbouring woods were the numerous leeches, of which one was sure to bring home a number on one's body after every excursion. Near Mount Finnigan I collected many bandicoots (*Perameles macrura*), and particularly many native cats (*Dasyurus hallucatus* and *Dasyurus Geoffroyi*), which were much more frequent here than on the Burnett. Besides, there exists a considerably larger species, designated by the settlers "tiger-cat," of which we did not obtain any specimen. Perhaps this is *Dasyurus maculatus*, but perhaps another yet undescribed species.

Wherever we turned we found tracks of natives, but we never met any of them personally. This was a great disappointment, for I had hoped to take some of them into my service as hunters, as I had done on the Burnett. Here in the north, however, where the real savage country begins, and the laws frequently do not protect

the aborigines, they are very shy and do not dare approach men who go about all day with a gun. In the south reckless treatment of the blacks can at present only be indulged in with very serious consequences to the guilty person. Here, however, no fuss is made about such a trifle. On the whole, the treatment of the natives by the settlers is one of the darkest chapters in the colonisation of Australia. Everywhere and always we find the same process: the whites arrive and settle in the hunting-grounds of the blacks, who have frequented them since the remotest time. They raise paddocks, which the blacks are forbidden to enter. They breed cattle and sheep, which the blacks are not allowed to approach. Then it happens that these stupid savages do not know how to distinguish between a marsupial and a placental animal, and spear a calf or a cow instead of a kangaroo, and the white man takes revenge for this misdeed by systematically killing all the blacks that come before his gun. This, again, the natives take amiss, and throw a spear into his back when he rides through the bush, or invade his house when he is absent, killing his family and servants. Then arrive the "Native Police," a troop of blacks from another district, headed by a white officer. They know the tricks of their race, and take a special pleasure in hunting down their own countrymen, and they avenge the former deed by killing all the blacks of the neighbourhood, sometimes also their wives and children. This is the almost typical progress of colonisation, and even though such things are abolished in the south-eastern colonies, and in south-east and Central Queensland, they are by no means unheard of in the north and the west, as is shown by the following incident: I had heard that in the neighbourhood of Cooktown a quantity of blacks had been slaughtered for some reason or another by the black police, and that their remains had for a long time been left to bleach in the open bush. My humanity did not go so far as to prompt me to exert myself in order to obtain an honourable burial for their bones. On the contrary, I had the ardent desire to secure the remains of these poor victims for scientific purposes, the study of a series of Australian crania being of considerable anthropological interest. I therefore communicated with several people likely to know the whereabouts of the slaughter, but all in vain. The bones had been scattered or covered up some way or other—in short, we were not able to find anything. At this point one of the people to whom I had turned for information said to me: "A pity that H. is dead, he would have procured you as many skulls as you might have wished for." I asked how H. would have managed this, and

received the cool answer, "Oh, he would have shot them." The man in question was generally known to kill the blacks in the bush wholesale. But some years ago he himself was found killed in his hut about 70 miles from Cooktown. The suspicion first fell on his white mate, who, however, declared he was not in the neighbourhood at the time. Then it was proved that a little black boy whom he kept as a servant had killed him. One evening he had said to the child, "To-morrow I shoot you," and then had laid himself down to sleep. The boy, knowing his master, and finding the situation critical, had thought, as he owned later on, "Me shoot him first," and had killed his dangerous master with his own gun. The Justice did not punish the child for murder, as everybody who knew the murdered man declared that his remark of the evening before might just as well have been meant in earnest as in jest, and that the boy was quite right in anticipating the solution of the riddle. The boy had to be removed from that neighbourhood, lest he should fall a victim to the revenge of the friends and sympathisers of the murdered man, for the fact of a black killing a white, even in self-defence, is an enormity in the minds of these people.

As is seen by this story, a collector of anthropological specimens has to be very careful in a savage country. In New Guinea I heard that the Governor, Sir William M'Gregor, had nearly turned out an Italian naturalist, because the latter had declared his intention of collecting some hundred Papuan skeletons. His readiness to pay good prices in knives and tobacco was a great temptation to the simple savages to make inroads upon distant villages, there to procure themselves the needed material. Even without such an extra inducement, the pursuit of skulls for decorative purposes is a favourite sport with many Papuan tribes, and how much more so if, as in this case, something might be earned by it!

Naturalists have to be very careful about this kind of collecting, and ought closely to examine both their black and white purveyors before entering into commercial relations with them.

As during our presence in these parts not a single black appeared to us, we had to shift without them. On the whole, I can say that our hunting was a success. After a time we found out that the tree-kangaroo had never been seen at the foot of the mountain, but only higher up in the dense forest covering its summit. To get there with our dray was impossible. Four tin-diggers, however, were known to live up there, the very men who had brought

the news of the existence of tree-kangaroos down to Cooktown. Asmus went up to see them, and brought us word that we were welcome to their camp for a couple of days.

The log-house of the tin-diggers, called the "top-camp," lay about 1300 feet above our own camp and 2000 feet above the level of the sea, and it took us four hours of tough climbing to attain our goal, as we were obliged to carry our blankets, guns, and ammunition along with us. Such climbing expeditions, beneath a tropical sky, through densely-entwined forests, over slippery rocks, and through icy mountain-streams, are much more exhausting and tiresome than mountain tours of three times their length and steepness in the cool and invigorating air of our Alps.

From the top-camp one enjoys a fine prospect of the surrounding mountain ranges, unless the fog, which frequently surrounds the mountain-top, obstruct the view. Here we find ourselves in the midst of a granitic range, reaching its highest elevation in the north in Mount Thomas and Mount Amos, and stretching itself beyond the Black Mountains to Mount Cook, near Cooktown. To the south this granitic range extends beyond the Bloomfield district to Cape Tribulation, and even farther. Close before us we see Mount Finlayson and Mount Romeo. The fine name of the latter is derived from a black called Romeo by the colonists, by whose help rich tin-fields were discovered in those parts. To the north-west wide plains are seen spreading out, and at their farthest distance we noticed some lakes and lagoons, the Kingsplain Lakes. Far to the west we see the plains bordered by further hills, and it is amidst these mountains that the Normanby and Palmer Rivers arise.

Our four hosts, simple, but honest and sober men, had discovered the Mount Finnigan tin-field two years ago, and had raised two solid log-houses near the top of the mountain. Tents or humpies, which would have been at once blown away by the wind, would not furnish sufficient protection against the sometimes considerable cold. The alluvial tin deposits are to be found in a former river-bed, and have a thickness of about 3 feet. If one has the necessary water, the washing of the tin is a very simple process. The tin-bearing deposit is put into large wooden boxes and washed by a powerful jet of water which is led over it, while at the same time it is thoroughly stirred and kneaded with a strong iron fork. The water takes the mud and sand along with it, while the heavy tin sinks down, settling on the bottom of the boxes. In this way those four people obtain an average of half a

ton of tin a week, which is worth about £25, so that a year brings them a profit of about £1300. They hoped to work their mine still two years longer with the same success, and so to raise a total gain of £5000. Thus each of the four, charges deducted, would have a pure profit of £1000 from four years of hard but successful labour. This sounds very grand, but one must consider that these people have to wander about as prospectors for a long time ere they find a place worth the trouble of digging. During this period the prospector earns nothing, but, on the contrary, has often enough considerable expenses. He has to pass through districts that have rarely or never before been crossed, has to undergo serious privations, always on the look-out for attacks from hostile natives, and this sometimes for years, ere the desired success be obtained. When at last he finds a promising place, he has to announce his discovery to the nearest magistrate, whereon a "claim" is granted him. If it is alluvial gold or tin that he has found, the obtaining of water for the washing of the metal is the principal thing to look out for next. Most wonderful was the aqueduct the simple and technically quite untaught tin-diggers of Mount Finnigan had constructed with their own hands to conduct the water through miles of the roughest and most rugged country to their little mine. Sometimes a few months' digging will show that the mine is not worth the working, or is approaching its exhaustion, and even in a more fortunate instance, like that of the top-camp on Mount Finnigan, a work of years in such savage and lonely surroundings is not to everybody's taste. He, therefore, who finds life in the old world close and hampered, or is discontented with the modest earnings of continuous mechanical labour, ought to think twice ere he emigrate to Australia and become a prospector. It is true that the life of the latter is the more varied and exciting, and offers a wider prospect. On the other hand, however, it makes far higher claims upon courage, perseverance, and manly ability.

The top of the mountain was covered by an impenetrable forest, which forms the haunt of the tree-kangaroo. We soon saw that it would be impossible simply to walk into this, and to begin hunting. Luckily, however, the tin-diggers, on leading their aqueduct from a source near the mountain-top to their camp, had cut a passage into the wood. The aqueduct ascended along the steep declivity of the mountain, straight through the densest forest, where a pathway had to be hewn with knives and axes—an excessively hard and toilsome work. The water was led through mighty palm trunks,

halved lengthways, and excavated by removing their soft central pith. Sometimes the aqueduct runs close to the ground, sometimes over scaffoldings 3 yards high. Here it leads through impenetrable thickets, there over slippery rocks, along the margin of ravines, over crevices and hollows. The main difficulty of the work consists in the calculation of the angle necessary to give the water the desired fall. This whole enormous work of about 3 miles in length, which fetched down the water from 1700 feet above the top-camp, had been constructed by four simple men, without the slightest technical training, and in a place far from all cultivation, in three months. This was indeed an admirable performance, and I felt an enormous respect for the energy of the four men, so entirely thrown back on their own resources. It impressed me more than many a grand work of technical skill, produced by the complex mechanism of our modern division of labour, and aided by all the advantages of science and trade.

The native forest of these regions was conspicuous for its beauty and richness, but was, for the most part, quite impenetrable. The tree-nettles do not seem to ascend so far; but the humidity, settling on the slopes and surrounding them in the shape of fog, favours the growth of a quantity of bigger and smaller plants, which thrive so abundantly as to form a sort of compact wall. All the rocky declivities are covered by mosses and lycopods, and even some little orchids grow so luxuriously as to produce a thick carpet, which covers a part of the ever-trickling rocks. The trunks of the gigantic palms and ficus are likewise covered by epiphytic ferns, orchids, and lycopods. Between the crowded trees we find a mass of herbaceous and bushy undergrowth, and all this is tightly interwoven and hopelessly matted by all sorts of creepers.

To climb along the aqueduct, our loaded guns in hand, was rather troublesome, if not dangerous work, as we had no "alpstocks" to help us along, and could hardly gain a footing on the slippery rocks. At a height of about 3600 feet the aqueduct came to an end, and the difficulty of getting on and reaching the top grew so great that I desisted, my desire to ascend the summit of Mount Finnigan not being so ardent as that of meeting its curious inhabitants, the tree-kangaroo. And that these animals should occupy the very highest mountain-top seemed very improbable.

The tin-diggers had told us that, during their two years' stay, they had seen the animals but twice, one on top of a tree, another

on the high framework of the aqueduct. We indeed found kangaroo dung in several spots, and, as it was incredible that common kangaroos should live in these thickets, we felt sure that tree-kangaroos had been about. Besides tracks of the animals were to be observed on some trunks of trees. The creatures themselves, however, kept hidden. Possibly they were above us as we walked along, the dense screen of foliage overhead being absolutely impenetrable to our sight. Besides, the kangaroos are wont to sleep on the trees during daytime, beginning to move and to gather leaves for food only after dark. To hunt the creatures with success a good dog is indispensable, which will point out the tree on which the kangaroo is reposing; or else a black expert, like my old Jimmy of the Burnett, whose sagacity and sharp-sightedness would have discovered the game even without the help of a dog. The little fox-terrier, which the younger Asmus had with him, and which was very useful for the discovery of bandicoots and native cats, was not equal to this difficult task. We were also rather anxious on his behalf, as the tin-diggers had told us that these surroundings abounded in death-adders.

I therefore saw that to continue the search for tree-kangaroos without any dogs or expert natives was useless, and that I had better give my attention and time to other objects. Once up here, I collected a number of slugs, land-leeches, and land-planarians, some of them new species, all of considerable zoological and geographical interest. To my great annoyance the bottle in which I preserved these specimens, and which I forwarded to Europe, got lost in some unknown way. This was the only part of my collections which met with accident and became lost to scientific investigation, except a number of rare orchids, which I collected up there and sent to the Jena Botanic Gardens, which did not bear the transport and perished on the way. My stay on Mount Finnigan was thus pretty unsuccessful scientifically, but I still think with pleasure of my visit to the camp of the tin-diggers, and of my tiring excursions in their magnificent forests.

Returning to the foot of the mountain, I resolved to direct my steps to the north, and to raise a camp north of the Black Mountains, in the hilly district between the Annan and its tributary the Esk River, near to the M'Carey farm, where a number of wallabies were said to exist. On the way there I killed a splendid specimen of a python, *Aspidites melanocephalus*, which had never before been seen in Queensland, and was believed to live only in the north-west of Australia.

Near our new camp we found numerous wallabies, but to our disappointment none with early embryos, but only with young ones in the pouch. This new camp, however, did not yield any object of special interest. Conspicuous was the great quantity of wasps of a particularly hostile temperament. They had their nests in all the low bushes about our camp, and punished every careless approach by furious attack. Very frequent was the Australian bustard, *Choriotis australis*, excelling in size our European bustard, *Otis tarda*. Like its European relation it chooses wide plains for its home, and is therefore called "plain-turkey" by the colonists. We often saw dozens of the majestic birds walk about among the grazing cattle. But, like our own bustard, the Australian representative is so shy and cautious even here, where it is exposed to hardly any persecution, that we rarely succeeded in getting into shooting distance. Still we contrived to kill several birds with our rifle by using grazing cattle, the neighbourhood of which they do not seem to mind, as a covering. The Australian bustard furnishes an excellent roast, enough to satisfy three hungry men.

I stayed another half week at Cooktown, where I saw much of the Police Magistrate of that town, Mr. H. M. Chester, formerly an officer in the Indian army, who had travelled in Persia, and had seen a great deal of the world. He was one of the pioneers in North Queensland, and also one of the first explorers of New Guinea. At Cooktown I also made the acquaintance of an English lady, Mrs. E. Rowan, who was staying there for some time. She was very much interested in botany, and had made a series of oil-paintings, representing the blossoms and fruit of Australian plants in a truly admirable manner. Her pictures were perfect works of art, combining scientific exactness with æsthetic beauty. I had never before seen botanic studies of similar perfection. To enliven her pictures, she had here and there put in a handsome Australian insect, beetle, or butterfly, sitting on the plants, or flitting around them. It was a pity, however, that she had grouped plants and insects at random, without caring if any relationship existed between them. This proceeding, though indisputable from an artistic point of view, seems to me not quite fortunate in paintings principally destined for scientific use. I hope that Mrs. Rowan has found a publisher for her excellent work. At that time she had the intention of going to New Guinea and living at a missionary station, to extend her studies to the flora of that country. I do not know whether this courageous plan was executed, courageous because at that time no white woman was living in British New Guinea.

Steering from Cooktown to the north one has to pass at first a rather narrow part of the Reef Channel, the ship taking its course quite near to the Barrier Reef, which hereabouts lies very close to the surface. Here and there a signal staff is erected to facilitate navigation. In Princess Charlotte Bay the canal gets broader, as the reef does not follow the indentations of the continent. The coast of the bay is very low, granite and porphyry have disappeared, and the whole northern part of York Peninsula consists of desert sandstone, which covers an enormous area of Queensland and New South Wales and a part of Western Australia, thus forming perhaps one-third of the whole continent. Formerly this deposit was considered Tertiary, and the apparent absence of fossils, as well as other lithological reasons, seemed to prove it a formation deriving its origin from the action of wind. The discovery of an abundant marine fauna in the desert sandstone of Maryborough and North Queensland (particularly in the neighbourhood of Cooktown) disproves this supposition, indicating the Upper Cretaceous age as productive of the desert sandstone. From Cape Grenville the east coast turns in a more north-eastern direction, and, falling in with the converging west coast, forms the northern point of Australia, culminating in Cape York. Here the Barrier Reef separates from the east coast, running straight on in a due northern direction, and ending in a series of small reefs near Bramble Bay, off the New Guinea coast.

Our steamer followed the Australian coast, and then wound its way through the narrow pass between the northern extremity of the continent and Albany Island, the so-called Albany Pass. This natural passage, about four miles in length, is so straight in its general direction that one can look through from end to end, and so narrow that one might almost grasp the sloping and woody shores. On the continent, close to Cape York, is a squatter station, combined with a pearl-fishing establishment called Somerset, and belonging to one of the oldest and most-renowned North Queensland colonists, Mr. Jardine. The passing vessels follow the habit of saluting his house with a gunshot. Formerly this was a greater settlement and the residence of the Government officials for the control of pearl-fishery. Since then the neighbouring Thursday Island has become the central point of this trade, and Somerset, but for the station of Mr. Jardine, is desolate. Cape York and the islands in its vicinity consist of desert sandstone in almost horizontal layers. The rocks are covered by a rich vegetation, and the Pass with its tranquil waters, and its grand yet lovely shores, forms

one of the most picturesque landscapes of that beautiful coast. Some small islets north of Albany Island are quite covered with curious red mounds, 3 to 6 feet high, "the tombs of the first settlers," as the sailors like to assure you, with solemn faces—in truth, however, the elaborate mounds of the white ants so common in this region.

CHAPTER XII

THURSDAY ISLAND AND TORRES STRAITS

STEERING north-west we enter Torres Straits, the flat and narrow strip of sea separating Australia from New Guinea, and barricaded by islands, sandbanks, and reefs like no other channel in the world. In 1606 the valiant Spanish mariner, Louis Vaez de Torres, passed through these straits, which derive their name from him. He saw the mountains of the York Peninsula, and definitely proved the island character of New Guinea. His discoveries were, however, kept secret by the Spaniards for 150 years, from jealousy of other seafaring nations, and were only made known in 1762, when, after the conquest of Manila, the English perused the archives of that town. Eight years later, in 1770, the passage through these Straits was repeated by James Cook. The safest course, chosen by almost all the bigger vessels, is to steer northwards round the northern row of the Prince of Wales Islands, Tuesday Island, Wednesday Island, Hammond Island, and Goode Island, and to quit the Straits by the Prince of Wales Channel. On following this course Thursday Island is not touched, as it lies south of the afore-mentioned row of islands, between them and the yet more southern group, Horn Island, Prince of Wales Island, and Friday Island. Ships taking this route cast anchor off Goode Island. Vessels of smaller or medium size generally choose another course right through the isles of the Prince of Wales group, anchoring off Thursday Island. This islet lies in the very centre of the group, and owes its importance to this circumstance and to its fine and sheltered harbour. I was at first quite charmed with its scenery and surroundings. A hilly landscape, studded with gum-trees and tropical thickets, surrounded by other mountainous and wooded isles, on the shores of which one sees the light roofs and white walls of the pearl-fishing stations shimmer through the foliage. A blue sea, in the depths of which, at low-water, the light band formed by the innumerable coral

reefs is seen, a harbour always alive with some large and many small and middle-sized craft, while farther away from the shore white sails are seen floating like seagulls over the water—all this makes up a picture full of colour, life, and variety. Soon, however, I grew to dislike the place more and more. Though owning that personal reasons may have played some part in the process, I must say that the outlines of hills like these, the soft shapes of which appear yet more softened and mitigated by their vegetation, make a rather monotonous and dull impression on the beholder,

Thursday Island.

at least if he be condemned to look upon them for any length of time. I have had the same experience in other tropical islands not crowned by towering mountains, as for instance, in the islands of the Straits of Malacca. Much as we at first admire the rich woods and vegetation, we come to miss characteristic shapes as they are represented in such an eminent degree by the bare islands of the Ionic and Tyrrhenian Seas. These are beautiful not only in the beaming radiance of sunlight, but equally so when their bold outlines are set off by a dark and threatening sky. Capri, that jewel of an island, shows her noble forms never so conspicuously as against such a background, but the rounded hills of a tropical island with its softened contours are deprived of every charm by the absence of the sun.

I

from the good but noisy "Grand Hotel," the sample-room of which I arranged as a laboratory. It was a big room, with a cemented floor, very handy for my purposes, its only fault being that it was terribly infested by mosquitoes, which seemed to have chosen this deep and damp apartment for their assembly hall.

A prolonged stay in a hotel in the tropics is not much to my taste. The rooms are devoid of the luxury of windows, deriving light and air exclusively from the door, which generally opens on the verandahs which surround the house at each story, and are destined for general use. Nobody can prevent the other people from settling immediately before his door on some comfortable easy-chair, from taking their nap in the same place, and from chattering till deep into the night. Thus retirement, seclusion, and all privacy are rendered impossible. As on a steamer, one is perpetually in company, pursued by others into the very sanctuary of one's own room. In the Dutch Indies, hotels are built after the same system, but their verandahs are generally divided by screens, forming partitions that belong to the respective rooms, which is a great advantage.

In the Grand Hotel of Thursday Island there was a perpetual coming and going. Nearly all the steamers going from Europe to Queensland and back call at this island to take in coals. Those going to Brisbane by the "inner route," that is through the Reef Channel of the Great Barrier Reef, here take a pilot on board, and there is always a group of these honest mariners about, who, having brought up ships from Brisbane, wait for vessels coming from Europe, on board which they return. Besides this there is a weekly mail service from Cooktown to Normanton on the Gulf of Carpentaria and back, while the big steamboats communicating between China and North Australia (Port Darwin), Sydney, Melbourne, and Adelaide also call at Thursday Island, which thus lies in the midst of a very lively international traffic. Besides this it is the centre of the most important local trade, the pearl-shell and *bêche-de-mer* fishing, becoming a rendezvous for adventurers of all races, and in this respect it has no equal on earth. On perusing an official paper of May 1890, I found the following data concerning the population of Port Kennedy (the name for the township of Thursday Island): Europeans, 270; South Sea Islanders, Chinese, Africans, Asiatics, Aborigines, and other races, 256; total, 526. Among the Europeans, in which category the white Australians are comprised, we

find persons of different nationalities ; besides the British, who form the majority, many Scandinavians and Danes, also many Germans, Frenchmen, Spaniards, and Portuguese.

The hotel boasted a small staff of regular visitors, gentlemen inhabiting the island, but preferring to dine at the hotel. The greater number of guests, however, changed from day to day. They consisted of pilots, sea-captains, passengers from the vessels anchoring in the port, and of pearl-shellers from the neighbouring islands. Round the bar we generally found Chinese and South Sea Islanders. The boots was an aboriginal of Mauritius, who vented his horrible French on every one who was so imprudent as to answer him once in that language. The verandah rang with a perpetual screaming and screeching of parrots and cockatoos, which were treated with general respect, and which tried their beaks on everything that came within reach. Thus there was life and excitement from morning till night, and never have I met with a hotel presenting so merry and motley a throng of guests, or so noisy and uncomfortable as a home. The queen of this curious little realm was its Irish hostess and proprietress, Mrs. M'Nulty, who wielded her sceptre with genial humour and amiable equanimity, and who was the kind friend and adviser of her guests.

Amongst all the inhabitants of the hotel I was most interested in the Rev. J. Chalmers, who stayed there for several weeks in March with his wife. He is one of the pioneer missionaries of British New Guinea, deserving, together with the Italian naturalist, D'Albertis, and the present governor, Sir William Macgregor, the greatest praise for the exploration of this hitherto inaccessible country, which presents far greater obstacles to the explorer than any part of Africa. Chalmers combined courage and energy with patience and charity. Though he never made use of weapons, he has still attained better results than many a traveller armed with a perfect arsenal and ever ready to give shot. Chalmers is likewise proficient as a writer, and has laid down his missionary experiences in two charming books. I spent some delightful evenings with him on the verandah of our Thursday Island hotel, while he told me of his sails along those shores, and of his observations respecting the aborigines of New Guinea, giving me precious advice for my own visit to that wonderful island.

Among the coloured people living in Thursday Island the majority consist of Chinese, South Sea Islanders, and inhabitants of the Philippines, here called Manilamen. This population is naturally very fluctuating, and their numbers are difficult to register.

The above-mentioned number of 526 inhabitants comprises only such as lead a somewhat settled existence on the island. Double the number live on the boats and ships, fishing for pearl-shells and *bêche-de-mer* in the adjoining seas; these are continually calling at the island to deliver their yields and take in provisions. During my stay on Thursday Island there were about 250 vessels of this sort about the place, mostly cutters and luggers of 10-30 tons, but rarely any bigger schooners.

The fishing of pearl-shells in these parts is prosecuted upon a very simple plan. Every lugger or cutter has a crew of four to six men, amongst them a diver, who lets himself down to the bottom of the sea in a diving-dress and there collects the pearl-shells. While he works below, fresh air is pumped to him from above. The diver, generally a white, is at the same time captain of the ship. The rest of the crew usually consist of coloured men. This mode of diving does not demand any particular ability, and in a depth of 4-5 fathoms it can be performed by any one. Diving in depths of 12-16 fathoms requires greater experience, since the severe pressure may easily make the unpractised diver so faint as to render him unfit for work. It takes considerable time to accustom one's body to extraordinary conditions, and this faculty of adaptation is soon lost again, so that a diver who has not been below for several years dare not work in great depths at once. The profession, if continued for years together, always proves detrimental to the constitution. It affects the chest, and many divers die of consumption.

In Torres Straits the tides are very strong, and while they last work on the bottom of the sea is impossible. The diver has to wait for slack water before he starts for his work. It is very tiring for one who bears, literally speaking, leaden weights on his body to pick up his spoils from the muddy ground. For the shells are found quite as often hidden in the sand or mud of the sea-bottom as on hard rock or coral.

Real danger threatens the diver only when the pipe of the pump catches on the rough coralline ground, and its twisting interrupts the supply of air. First the diver, who is caught in this calamity, will try to unfasten the pipe. If he does not succeed and cannot bear the lack of air any longer, he pulls at a rope, thereby giving the men who work the pump the signal to draw him up. If, through inattention of the men at the pump, his signal is not immediately observed, he may easily be choked. Sharks do not endanger these divers, as is often supposed. The

apparatus produces too great a noise, and the whole affair appears too uncanny to the cowardly fish to induce it to risk an attack. Torres Straits abound with mighty sharks, and some people earn their livelihood by fishing them, as their livers furnish a valuable fat. But I have not heard that they attack any diver, and my men never seemed afraid of jumping into the sea, even without a diving-costume, to free the dredge when it had caught in some obstacle. On the whole, the prevailing ideas of danger from sharks seem to me very much exaggerated. Individual sharks may possibly develop cannibal tastes, thereby terrorising a whole region, but such are exceptions, and of still rarer occurrence than among crocodiles and tigers.

On the shores of North Australia, Torres Straits, and New Guinea, we find big sharks as well as the mighty crocodiles peculiar to these regions (*Crocodiles porosus*). While the latter are held by whites and blacks in universal awe, nobody seems to mind the sharks. The pearl-fishers of Thursday Island believe that in certain places the crocodiles capture and devour the sharks lying at the bottom. I could not make out if this was true, but I do not think it impossible.

The owners of pearl-fishing boats, unless they themselves accompany the expedition as divers, have always a trustee on board, who opens the shells and takes out the pearls. On Thursday Island the fishing is principally kept up on account of the mother-of-pearl, which is furnished in an uncommon quantity as well as quality by the thick-shelled molluscs found in these regions. The mother-of-pearl is thick and of extraordinary brilliancy, and another kind, of a blackish-green mother-of-pearl of thinner quality, which is considered particularly valuable, is also found in these parts. Pearls, however, are pretty scarce in the shells of these regions, and rarely attain any notable size. The shells of Ceylon show exactly the opposite feature; here the mother-of-pearl is valueless, the pearls themselves of considerable beauty. Occasionally; however, fine pearls are also found in Torres Straits, and the crew of the boats are very clever at making them disappear when nobody is present to notice the trick. Some even assert a claim on a share in the pearls which are found.

The immediate surroundings of Thursday Island are at present despoiled of most part of their shells, and one has to dive at a greater distance from the land, and in depths of 12-20 fathoms, to make a good harvest. The ground is ransacked too thoroughly and recklessly to allow the younger generation of shells to thrive

as it ought. Therefore the fishing expeditions now extend to the Gulf of Carpentaria and the coast of New Guinea, which offer virgin ground to the diver. The Thursday Island pearl-fishers are very much inclined to take the south coasts of the small Malay Islands and Java into the range of their searchings. The Dutch Government does not, however, allow them to enter these waters with any diving apparatus, since it does not want an important trade of its Malayan subjects to be destroyed by outsiders. If a lugger from Thursday Island dares to show itself in their water, it is sure to be driven away by the Dutch men-of-war cruising there. Having occasionally remarked in my hotel that I intended to go to Java, and that I possessed recommendations to the Dutch officials there, I received on the following days visits from several people, begging me to procure them a license from the Dutch Government to fish in those parts, but to my regret I was unable to undertake this honourable diplomatic task. A lugger rarely fishes as much as a ton of shell in a month, *i.e.* 700 to 800 shells, valued at £120 to £150; and the whole Thursday Island yearly exports mother-of-pearl to the value of about £100,000.

I had heard in Europe of the grand dimensions the fishing of Thursday Island has attained, and had therefore believed that region to offer an extremely advantageous ground for study and collecting in marine zoology, proposing, if this proved true, to make it my headquarters. Every naturalist knows what rare and splendid specimens he will find in the fish-markets of the Mediterranean shores, in Genoa, Naples, Messina, and Trieste, where he hardly needs to go out fishing himself, so well will he be supplied by the fishermen of the place as soon as they know his wishes. This is the case wherever a regular fishing trade is carried on. With collectors of pearl-shells this is otherwise. They are no real fishermen, but at their best mariners who, if need be, can steer their boat through reefs and coral islands, but who lack most other knowledge of the living creatures peopling the water and the bottom of the sea. I was often quite astonished at the inexperience and lack of observation shown by divers who had spent several hours a day on the sea-bottom for years together. They seem to know no interest save that of gathering within the shortest time as many pearl-shells as possible. Besides, the sums they earn are so high, that the modest prices I offered them were not a sufficient inducement, and thus it happened that during all the time I spent in Torres Straits, I did not receive one single

object from a pearl-fisher. Once only did I obtain a number of fishes from a Chinese who used to supply our hotel with fish, and who was perhaps the one regular fisherman of the island.

The first thing I had to seek was a good sailing-boat. It had to be solid yet light, and fit to be managed by few hands. As I meant to use it for bigger expeditions, I wanted it to have a deck ; but at the same time the smaller and lighter it was the better, for I could then cruise close to the reefs and dispense with a numerous crew. I had brought with me from Europe recommendations to Messrs. Burns, Philp, and Co., the greatest commercial house in North Queensland, which possessed establishments in all the greater ports, and was the only one to extend its commercial relations to British New Guinea.

The manager of the Thursday Island branch, Mr. A. H. Mountain, was kind enough to advise me whenever I applied to him. He undertook the engagement of a crew and gave me all necessary information. Through him I obtained the *Mary Owen*, a cutter of 3 tons, for the moderate price of £1 a week, and she proved just the thing for my work in Torres Straits. He further aided me to procure a diver as captain and two sailors for service on my little craft. The diver, Wilson, a Dane by birth, when a ship's boy of sixteen, had undergone shipwreck on the North Australian coast, and had since then led a life in those parts as a sailor, *bêche-de-mer* and pearl-fisher. Gradually he had worked his way, and till two years ago had devoted himself to *bêche-de-mer* fishing in his own lugger.

Bêche-de-mer, or tripang, as already mentioned, are eatable species of Holothuria, a class of Echinodermata. China yearly consumes great amounts of this delicacy, and it is said that the voluptuous Chinese regard it as an aphrodisiac. It is by all means a great delicacy, and tripang soup is not inferior to turtle soup. There are several eatable species of these. The genera *Mülleria*, *Stichopus*, and *Bohadschia* are much sought after, whereas other species do not fetch such high prices, and some kinds are not at all suited for food. The animals are prepared by being duly boiled, and then dried and stewed in fresh water. Finally, they are submitted to a long-continued smoking process. Only the non-calciferous part of the animal's skin is used for food, the calciferous portion and the viscera being removed.

Since time immemorial the aborigines of all races of the Indian archipelago, particularly of the Philippines, Celebes, Goram, Aru, and lately also of Java, have supplied the Chinese market

with this delicacy, and for a long while the whites have taken up this trade, and tripang is now as eagerly collected by the Americans of the West Indies and the Bermudas as by the Australians of the north-east coast and in Torres Straits. In Australia the experiment of introducing this delicacy to the European market has been tried. An enterprising firm has begun to preserve tripang in tins, the contents of which, when boiled and seasoned with the proper ingredients, furnish a delicious soup, which I very much enjoyed whenever it was offered me on my journeys. This experiment, however, has not met with much success, for at present only very few European firms number tripang among their goods. The difficulty of accustoming human beings to food to which they have not been used since childhood is generally great, and it is with the utmost reluctance that they will make up their minds to a hitherto unheard-of dish, even if it be represented to them as the very quintessence of everything that is good.

The method of *bêche-de-mer* fishing is very simple. The owner of a boat, generally a white or Chinese, Malay or Manilaman, fits out his ship with a crew of natives of the Australian coast, these being less expensive than South Sea Islanders or Manilamen. He and his men remain on or near the reefs, collecting tripang and preserving them on the spot, till either their boat is fully loaded or their store of provisions exhausted. Then he will return to his starting-point, Thursday Island. The *bêche-de-mer* are simply picked off the reefs at low tide. Those hidden below the water are speared or captured by diving, the dredge being rarely used for fetching these animals out of greater depths. The Great Australian Barrier Reef is a particularly good hunting-ground for *bêche-de-mer*, but if the working with Australian aborigines is cheap, it is, on the other hand, dangerous, for the blacks of the north coast are said to be rather vicious, and have upon several occasions murdered their white employers. Sometimes this is done out of greed, sometimes because they are not treated in the right way, or at least think themselves badly used.

My pilot, Wilson, knew many a tale about such doings, and had himself had a narrow escape from the spite of some natives. According to him the event was as follows. Two years ago he had been fishing for *bêche-de-mer* near the Great Barrier Reef, with a numerous crew of blacks, some of whom, aborigines of the Australian north-east coast, had been at work with him repeatedly during the last nine years. He was just returning to Thursday Island to lodge a complaint against some Manilamen, who had

the month before enticed four black women, or "gins," belonging to his own men on board their ship and had sailed off with their prize. Wilson had thereon sent a written complaint to the magistrate of Thursday Island by a fisher-boat which was just returning to that place, and, as nothing came of this first step, he had resolved to intervene personally, hoping thereby to effect the punishment of the culprits.

While his boat was sailing along with a good wind, and he had just been giving some orders about the setting of the sails and was in the act of lighting his pipe, he suddenly felt a violent blow on his neck, which nearly took away his senses. He imagined himself hit by a falling sail-yard, and turned round to look, when he found himself assailed by several blacks and had but just time to evade a tomahawk thrown at him. The moment after, however, he received a terrible wound from a three-pointed fishing-spear, which hit him below the right eye, laying it bare, and tearing the skin of the cheek to pieces. He pulled out the spear, but was, however, too exhausted to offer any resistance when the blacks took hold of him, pulling him to the side of the boat to throw him overboard. He now took to pleading, reminding the men how he had always taken care of them, and promising them to do everything in his power to secure them their women. He relates that the blacks, instead of listening to his assurances, tried to lift him up in spite of his protestations, and to throw him into the sea. At this very moment his clothes gave way and became torn, thus causing him to fall, not into the sea but into the hold, where his loaded Winchester rifle was hanging. This version seems to me somewhat improbable. I rather think that the stupid blacks let him go in consequence of his beseechings and protestations, thus enabling him to catch hold of his gun. He instantly fired several shots into the crowd, whereupon the whole party, without losing any further time, jumped into the water. Now the tables were turned. The blacks implored to be taken on board again, the next coast being about 30 miles distant with no reefs or sands in the neighbourhood. Wilson, however, only rescued the one black woman, and then continued his course without paying any heed to the entreaties of the others.

It took him seven days to get to Somerset and into regular medical treatment. Severely wounded and unbandaged as he was, he had grown so weak that the black woman had to steer the ship and set the sails while he lay helplessly prostrate.

How far the details of his tale were to be trusted I could not

make out. This much, however, is certain, that his ship arrived at Somerset without its crew and steered by one black woman, he lying in the hold, his eye hanging out of his head, more dead than living. His report was moreover confirmed by his black guardian angel. Of course his wound took considerable time to heal, the skin being destroyed far around the eye by the hooks of the pointed fishing-spear.

Dr. Salter of Thursday Island performed a plastic operation on the damaged cheek, covering the wound by a piece of skin derived from the patient's arm. Naturally, the man remained terribly disfigured, besides suffering considerable loss of strength. He may be thankful, however, to have retained not only his life but his eye. No wonder he gave up working with an Australian crew once for all, and that he was happy to get into my service and to rest from the fatigues of pearl-diving.

Besides Wilson I engaged two white sailors—an Australian, Charles Smith, and a Scotchman, John Paterson. As often as possible I managed to return to Thursday Island in the evening, to preserve the sea-animals, which in that tropical heat are hard to keep in small vessels where they soon decay. Sometimes, however, when making longer excursions I had to stay away for several days. Then I slept on board my nutshell or on the shore of some island, and had to supply myself with a number of bottles and other vessels, as with alcohol and the usual fluids for preserving the more tender specimens on the spot. To my regret, Thursday Island soon proved to be a very disadvantageous starting-point for marine investigation. The tides, powerful as they are in all those parts of the ocean, are doubly so in narrow Torres Straits, where the sea, obstructed by thousands of reefs and sandbanks, ebbs and flows with the virulence of a mountain-stream amidst that maze of islands. Thus sailing is entirely dependent on the tidal changes. The tide off Vivian Point flows, under ordinary circumstances, at a rate of 7 knots. In periods of spring-tide, however, the current sometimes attains a rapidity of 10 knots and more, so that big ocean steamers are powerless against it. Of course a small sailing-boat is quite unable to get along against such a rush; and nothing is left but to cast anchor and wait for slack water. This is most annoying and means a great loss of time, as, within this labyrinth of sand and water, the greatest irregularity was found to reign in the direction of the tidal streams.

A great number of zoological species retire before these violent currents into more tranquil waters, and only the inhabitants of the

coral reefs, which here as everywhere are at home in a lively sea, are present in varied and most interesting forms.

In collecting we dredged in the deeper water, or collected upon the exposed reefs while the water was low. The latter method furnished me with many interesting and partially new species; still more copious than on the coast-reefs surrounding the islands was the harvest on the small single reefs dispersed between. A certain precaution has to be observed when collecting on the reefs. In the shallow water lie, their sides unfolded, the gigantic *Tridacna*-shells, such as are sometimes used in Europe as a font for holy water in Catholic churches, or as ornaments in halls and gardens. Woe to him who, in wading through the water, carelessly touches one of them. Many a searcher of tripang has met with this accident, and has had his foot cut through to the bone by the shells, which shut up with enormous force. No human power can open the shell, and a man thus caught can only be relieved by his companions cutting the adductor-muscles of the shell with a knife.

These reefs and the recesses of the coral rocks are also peopled by a number of fish (*Percis*, *Sillago*, *Batrachus*), the back or the operculum of which are armed with a spine inflicting a painful and even dangerous wound. It is very amusing to see how, as soon as the water retires, a quantity of little sharks assemble near the reefs, to hunt the shallow waters for animals that have been overtaken by the ebb and thus entrapped and rendered powerless. Sometimes the little sharks are caught in their own trap, for, surprised by the withdrawal of the water, they may be left on the dry land and prevented from reaching the open sea. I once killed two young sharks in shallow water, simply by throwing stones at them.

Much amusement was caused me on my trip by another fish, the *Echeneis*, or sucking-fish, which possesses a sucking-plate at the top of its head extending over the front part of the back. This is flat and of an oval form, and serves to attach the fish to ships, turtles, and bigger fishes, particularly sharks, by which it may be carried about. I knew these fish, which, by the way, occur also in the Mediterranean, from books but had never seen one alive.

Once, during ebb-tide, we had collected animals among the mangroves of Wednesday Island, and had caught some of the gigantic brown crabs, which are frequent in the mangrove swamps of that coast, where they hide beneath roots and stones. They may, be well compared as food to the lobster, but I am unable to state the name of the species as, I am ashamed to say, I neglected

embodying any into my collections, preferring to relieve the monotony of our daily fare of rusks and tinned meat by this savoury animal. I, moreover, sought in vain for small specimens fit for preserving, whilst big ones, which are nicer for cooking, abounded. But to return to my tale. We boiled our crabs on board ship and had a good meal of them. On throwing the emptied fragments of the shells one by one overboard, I soon remarked some fish of about 9 inches in length which, as soon as anything fell into the water, darted out from below the ship and gulped down the morsel, whereon they immediately disappeared. The next morsel I threw out contained a fishing-hook, and brought up a fish which I instantly recognised as *Echeneis*. I hoped to catch some more, and threw out my hook again and again. It remained untouched, and so did further morsels without any hooks which we threw out afterwards. What had turned the mind of these fishes which before had so eagerly shared our meal? It was clear that they had taken warning from the fate of their companion and were resolved to resist further temptation. Throughout that day they remained attached by their sucking-plates to the keel of our boat, thus exhibiting a cleverness and power of observation which I have never seen in any fish. Any one who has fished will know that fish will persist to gather round the bait, even if many of their kind have been caught and drawn struggling out of the water before their very eyes, yes, even though they themselves have been hooked once or several times before. Later on I caught several *Echeneis* in the same fashion, but always only one at a time.

In Torres Straits there exist two species of this fish, *Echeneis naucrates* and *Echeneis remora*. Till now the reason of their attaching themselves to ships, turtles, and big fish has not been ascertained, but the little incident above mentioned may serve, I think, to throw some light on the point. They live on the droppings from the ships, besides catching some smaller living booty which chance brings in their way. That they are not by far such bad swimmers as is usually thought, was proved by the agility with which they snatched the parings from our little craft, and immediately returned to the swiftly-sailing boat, and it appears to me that their habit of attaching themselves to other animals, such as sharks and turtles, may be probably due to their seeking food among the excrements of these creatures.

On the coarse sands of the sea-bottom, between Prince of Wales and Friday Island, my dredge brought up several *Amphioxus cultellus*,

a species of the celebrated lancet-fish, which showed some interesting peculiarities. *Amphioxus* is the most primitive vertebrate, or rather chordate, for it does not yet possess a real vertebral column. It is justly regarded by most naturalists as the nearest living representative of that group of vertebrates which forms a link between the fishes and the more lowly Tunicata (sea-squirrels and salps). To dredge in Torres Straits was difficult and resultless. The dredge caught every moment in the rough coral ground, and was very tiresome to extricate, whereas the sandy parts of the bottom were mostly devoid of living animals, offering only empty shells and the like. This was due to the violent currents which move the sand up and down, thus preventing the animals from settling on the bottom. Only very rarely did I find areas populated by a number of animals. How rich a fauna may be found in shallow water and between the reefs, I shall have occasion to point out when dealing with the island of Amboyna. Thursday Island, however, excels in numerous and fine Alcyonaria, which grow abundantly beside the reef-building corals.

Tiresome as it often was to wait for a change in the tides, and to lie idly at anchor between some islands till it grew possible to land in a safe place or to pass through some narrow channel, these intervals of waiting still enabled me to make many an interesting observation. A frequent object in Torres Straits is the clumsy dugong or sea-cow (*Halicore dugong*). It and the Manatee (*Manatus*), inhabiting the African and American coasts of the tropical Atlantic, belong to the order of Sirenia. They do not, however, exactly coincide with the idea which most of us have formed of the enchanting sea-goddesses of the Greek myth. Their body is fat and clumsy, their neck short and thick, head and face roughly formed and very stupid of expression. The front extremities have been transformed into fins, while the hind have degenerated, and the whole body terminates in a fish-like tail. Like whales and seals these animals are genuine mammals, and the only things they have in common with fish are their habits of life and some of their external characters, due to their adaptation to marine life. It must, however, be owned that they look more fish-like than seals and more mammal-like than whales, and that, as their head slightly reminds us of a magnified bull, and the breasts of the suckling females strongly protrude, the name of sea-cow is no ill-chosen one. Not so the name of siren, which is indeed a shock to all our classic reminiscences. At present zoologists are inclined to classify them rather near the hoofed animals, and perhaps the

investigation of the three embryos brought back by me will throw some light on the matter. There is certainly no relation between them and whales, and just as little between them and seals. The latter are undoubtedly closely related to the beasts of prey. Besides the Atlantic Manatee above mentioned, and the Indo-Pacific *Halicore dugong*, we find, within the Historical Period, yet a third representative of the order of Sirenia. This is the *Rhytina* of the Behring Sea, which attained a length of 20-30 feet, and was called after its discoverer *Rhytina Stelleri*. When Steller, whose ship got stranded on Behring Island in 1741, had to pass the winter there, the animal was still existent in those parts. Thirty years later, it seems to have been almost destroyed by whale-hunters, and now it is a creature of the past.

I have never seen any big herds of dugong in Torres Straits, though I often saw the animals in pairs and small groups. They were not particularly shy, in spite of their forming a favourite game of the aborigines of the Torres Straits Islands. They are most abundant in the northern part of Torres Straits, between the Banks and Mulgrave Islands and the New Guinea coast, particularly so on the Ormans Reef. The clumsy creatures principally feed on the submarine meadows of seaweed, which thrives most luxuriously in the sheltered bays of those islands, and in the tranquil waters of the reef-channels, which one may well call pastures of the sea-cows. They come to graze at night, returning to the same place again and again, till they have devoured the whole meadow. Being true mammals they breathe atmospheric air through their lungs, and are unable to remain below the water for any length of time without rising to the surface at short intervals to breathe. Once I observed a large male from a short distance. He seemed quite undisturbed by the proximity of our boat and by our presence on the same, and appeared above the surface every three to five minutes, lifting the greater part of his heavy body out of the water, breathing with a peculiar snorting noise and slowly disappearing again. Wilson told me that he had often seen females carry about their clumsy calves on their backs. The aborigines of Torres Straits are very clever in approaching dugongs in their boats. They stealthily drift up to the place where the sleepy animal is observed to dive, and harpoon it when it appears above the surface to breathe. The peculiar harpoon used for this purpose consists of a short and sharply-pointed barbed peg made of hard wood or bone, sometimes of iron, set on a spear-like shaft, fixed to the end of a stout rope. This shaft remains in the hand of the pursuer, while the animal, with

the peg fixed in its body, darts down into the water, the rope communicating between peg and shaft indicating its position. As soon as the defenceless creature reappears, its extremities, particularly the tail, are caught in ropes, and at last the exhausted animal is kept under water by a number of natives, who dive and hold it down by ropes whenever it attempts to rise to the surface until it is drowned. Another method of the aborigines consists in finding out a seaweed meadow frequented by dugongs at night, and the erecting a sort of light stage or scaffolding there, upon which they lie in ambush and harpoon the animal in the manner already described. The capture of dugongs is easiest during rutting-time, as love makes them blind and deaf. This is the period chosen by white dugong-hunters for their pursuit, and it was during it that the three embryos I received were obtained. The whites capture dugong principally for their fat, which is said to possess therapeutic qualities. It is considered an excellent remedy for consumption, but, happily for the dugongs, this seems to be a mere superstition.

I have not tasted their meat myself, though some whites are very fond of it, and compare it to veal. Others, however, describe its taste as disagreeable and insipid. The aborigines of Torres Straits consider it a great delicacy.

Similar to the pursuit of the dugong is that of the gigantic alderman's green turtle, *Chelone mydas*, which is also harpooned and held fast by ropes, while a native dives for the wounded creature. Like the dugong, this animal is easiest to capture during its pairing-time, which lasts from October to February. Good divers generally jump on the back of the clumsy animal, try to turn it over before it has had time to dive, and then sling a rope round it; but a third very peculiar method of capture is adopted in Torres Straits.

In clear weather and a tranquil sea, the sharp eye of the native is able to discern any turtle reposing on the bottom of the sea in the neighbourhood of the coast reefs. Now a sucking-fish, or *Echeneis*, to the hind fin of which a long string has been fixed, is thrown into the water above the place where the turtle has been seen. It will immediately descend into the depth and attach itself to the shell of the reposing Chelonian, and as a communication is thus established between the boat and the turtle, a native, following the leading-string, dives and winds a rope round the beast, as the sucking-fish does not attach itself quite firmly enough for the fisherman to draw the heavy weight up by it.

Turtles are also caught on land, where they come to deposit

their eggs and to bury them in the sand of the shore. This is the method principally used for catching the small and lively tortoise, *Chelone imbricata*, which furnishes the real tortoise-shell, the flesh of which, however, is almost uneatable. It is a carnivorous animal, and a beast of prey, and not like its savoury relation a vegetarian. It is less frequent in Torres Straits than the latter. On fine and tranquil days, however, one can easily observe it coming noisily to the surface and breathing very audibly, then disappearing again in the depth.

I had heard that there was a group of small islets east of the Prince of Wales Island, where both these Chelonians used to deposit their eggs. For *Chelone mydas* the season was already somewhat too far advanced, but of *Chelone imbricata* I hoped to obtain some embryological material.

Although we started from Thursday Island at sunrise, it took us full seventeen hours to reach Strait Island, as we had hardly any wind and the flood was against us for many hours. For this reason we had to anchor off Wednesday Island for some time, which Wilson and I utilised to go on shore with our little dinghy. The shore is bordered by dense mangrove forests, and when at ebb-tide the burning sun shines down on the pools among the mangrove roots, a pestilential smell reigns over the place. It is no trifle to climb over the slippery roots and stones, and to work one's way through the dense network of branches and stems. We heard the call of the handsome Torres Straits pigeon at various points about us, but were prevented from shooting it by this tiresome mode of progression and the generally trying circumstances. Behind the mangroves we found the usual Australian gum-tree bush, and here we discovered, not more than 200 feet from the flood-line, and surrounded by low bushes, the mound of a tropical mound-builder *Megapodius tumulus*, which, in New Guinea and North Australia, stands in the place of the scrub-turkey or *Cathetus* (*Talegallus*) *Lathamii*, the habits of which I have already described in relating my stay on the Burnett. The mound of the *Megapodius* of Wednesday Island had a height of 3-4 and a circuit of more than 30 yards. It did not consist of leaves like that of *Cathetus*, but seemed constructed entirely of sand. My observations, and those of other visitors of these islands, seem to prove that here, in the vicinity of the equator, the warmer rays of the sun suffice to produce the heat necessary for the hatching of the young, whilst the inhabitant of New South Wales and Queensland, *i.e.* of cooler regions, has to take recourse to the warmth produced by the decay

of rotting substances to heighten the temperature of its brood chamber.

On the mound in question we perceived traces of digging, apparently the work of some big lizard which had discovered that these edifices contained some special delicacy. We, however, were not lucky enough to find any of the bird's eggs.

On the afternoon of that day we were able to continue our course, which led us past Tuesday Islands, two small islets which are preceded by a third quite tiny one. The latter has the shape of a cupola, and is covered with stately trees from head to foot, thus appearing like a pretty creation of some capricious artist. Towards eleven in the evening we approached Strait Island, which lay before us in the brightest moonlight, and here we cast anchor for the night. Early in the morning I repaired with Wilson to the little wooded island. On the shore we soon discovered the signs imprinted there by the heavy turtles on the occasion of their visits. These consist of two deep parallel furrows, the tracks of the fin-shaped extremities by which the animals draw their heavy bodies over the sand, and between these furrows one sees a broad flat strip, the track of the turtle's breast-shield as it was pushed along over the earth. These tracks usually lead straight up the shore some 30-40 yards beyond the mark of the highest tide. The tortoise takes advantage of high-water to deposit its eggs, as the lazy animal thus avoids the trouble of a longer walk. My men even asserted that the turtle only comes on shore during new and full moon, that is to say, in periods of spring-tide, an idea not at all at variance with what is known of the habits of animals, which, however, calls for long-continued observation to prove it beyond doubt.

If the turtles were in the habit of ascending straight up the shore, depositing their eggs and immediately returning to the sea, we might simply consider the end-point of their track an index to the depository of their eggs. They, however, proceed more warily. Their track does not return straight from its end-point, but suddenly turns in a right angle 10 or 20 feet to the right or to the left of its original direction, thus running parallel to the shore, and thence, turning again, leads back to the sea. Near this transverse part of the track lies the place where the eggs are hidden, though the spot itself is not at once to be found. One has, however, a simple method of ascertaining it. Take a pointed stick and thrust it into the ground at short intervals, to a depth of 1 or $1\frac{1}{2}$ foot; then draw it out and examine the point of the stick. Should you find it wet, you are sure to have hit upon the right spot, the moisture of the

stick being due to its having struck into an egg. In this manner we found five nests, one empty and four full, all of them sheltered by the little bushes growing on this part of the shore. The eggs lie at a depth of from 12-18 inches, just where the ground begins to get moist, and are covered by sand lightly pressed on top of them. They were found to belong exclusively to *Chelone imbricata*, the breeding-time of *Chelone mydas* being already passed. The number of eggs in each nest varied between 100 and 200. Two nests were of recent origin, and contained very young embryos; and two other eggs had embryos about the size of a chicken on the fourth or fifth day of incubation. We prepared a lunch of the newly-laid eggs, of which Wilson and two of my sailors, who had meanwhile come on shore, partook great quantities, while I limited myself to three that were walnut-sized. They have a peculiar and rather agreeable taste, though somewhat rich, so that I soon had enough of them. One can boil them ever so long without getting their yolk and their white to coagulate. I filled some boxes with the eggs I had found, packing them very carefully between sand, to take them with me to Thursday Island for further hatching. Only the older stages, however, outlived this little voyage and continued to develop. The younger stages, which were still without the embryonic covering or amnion, were lost to me, the germs, before the formation of the amnion, being insufficiently protected and exposed to all movements which affect the egg, get easily damaged and destroyed. Originally the eggshell is soft and reminds one of parchment; when the egg grows older, however, it becomes dry and at the same time stiff and hard.

Towards ten o'clock we left Strait Island and repaired to the neighbouring Double Islands, two islets situated close to each other and surrounded by a common reef. Here we met a solitary native, who had been stationed on these islands by a Manilaman to obtain specimens of the tortoise-shell turtle, which was expected to come there to deposit its eggs. The poor fellow had been sitting on the island for a month, had caught nothing, and was nearly at the end of his rations. He showed me a nest of *Chelone mydas*, which had been the day before abandoned by the newly-hatched young ones, and presented me with three living young turtles, which he had kept in a basin for his own amusement. Between the nest and the sea the tracks of the little creatures, who had escaped the day before, were distinctly visible. Hardly does their shell burst when they start for the sea. A procession of this sort is said to look extremely funny. Often the poor little pilgrims are welcomed by

a crowd of small sharks, which subject them to a cruel slaughter, killing off a quantity of the yet soft-skinned creatures, which at that age are smaller than our common river-tortoises.

I proposed to the man to take him with me to Thursday Island. He, however, preferred to remain at his solitary and badly-paid post, so that I could do nothing but leave him some of my provisions. Our sail back to Thursday Island began at full speed, a strong north-westerly breeze driving our cutter over the waves like a bird, while our progress was assisted by the tidal stream. Soon, however, the latter turned against us, so that we had to anchor between Horn Island and Thursday Island, where, beset by rain and wind, we had to undergo the usual tiresome waiting time.

From November to April, sometimes until May, the moist rain-productive north-west monsoon reigns in these regions. It extends over the whole part of the Malay Archipelago, south of the equator, and over North Australia, to the twentieth degree of south latitude, and eastwards to the Solomon Islands and the New Hebrides. In Torres Straits this monsoon does not appear as an even steady-going wind, but as a most capricious one. At one time it will rage for days together as a violent tempest, discharging shower after shower, then again follow periods of calm, during which the leaden sky will clear up, and a broiling sun pierce the saturated air. Now and again a sudden squall from the north-west will interrupt this peace, until, such attacks becoming more and more frequent, the intervals between them shorter and shorter, another powerful storm will rage over land and sea. During all this time the atmosphere is most sultry, and so moist that all the leather apparel from one day to another will become covered with a thick layer of mould, and sugar and salt melt away. The smallest exertion bathes one in perspiration, and on some days it is oppressive beyond endurance.

Often the storm was so violent that I could not think of venturing out to fish in my little boat. Those were unpleasant times in the little uninteresting settlement and its noisy Grand Hotel. Whenever the weather allowed of it, I strolled about on the island, the north-east part of which does not show many signs of human cultivation. The shore, where it is not covered by coral formations, consists of desert sandstone. The highest elevation of the island, the hill which rises immediately behind the settlement, was being changed into a sort of fortification. Now Thursday Island by no means commands the passage of Torres Straits, as it lies at some distance from the principal route, which leads northwards of Wednesday and Hammond Islands. In case, however, of a hostile

power endangering the Australian coast, it would be of importance as a coal-station and base for the north-east squadron of a British Australian fleet. As is known, the Australian colonies have combined with the mother-country in creating a fleet for the protection of the Australian coast, under command of a British admiral. During my stay in Australia, this fleet appeared on the scene, and was received with enthusiasm everywhere. Its presence would protect the Australian ports from any possible *coup de main*, in event of war between England and another naval power.

I was allowed to visit the almost completed fortifications of Thursday Island, and was, moreover, witness of a very funny episode. Queensland is so fortunate as not to be in want of a standing army, instead of which it only possesses a volunteer defence force, the organisation and training of which is committed to a number of British officers. Only the fortifications on the coast can boast a small standing body of artillery, as the handling of the big guns demands thorough knowledge and training. Now two officers of this troop came with twenty soldiers from Townsville to Thursday Island to direct the setting up of an enormous gun which was expected from England by the *Taroba*. All the preparations for landing, transporting, and setting the giant cannon were completed. The vessel arrived and began to be unloaded; first, the general cargo for Thursday Island, then heavy ponderous objects belonging to the gun. Last of all was to come its main part, the gun itself, to the appearance of which we all looked forward with the greatest excitement. It was in vain, however, that we waited, as it was not to be found in that part of the vessel where it was expected. Now began a general search, as one believed it to have been stowed away somewhere else by mistake. Everything was turned upside down, and I verily believe that some people looked for the gun in the cupboards and under the beds of the passengers. But after all a big cannon cannot, like a pin, be hidden away in the folds of a carpet. So, little by little, the truth dawned upon the public; the barrel had been forgotten in England, and at last even the crew of the ship and the officer, who had conducted the shipping of the gun, had to own to this trifling omission.

A telegraphic inquiry to England was answered by the announcement that the gun was on its way to Australia, and would arrive by the next steamer, which had left England about a month after the departure of the *Taroba*. As it would have taken them too long to await its arrival in Thursday Island, the little army had to depart and to return four weeks later. There exists a cable

between Thursday Island and Paterson near Cape York, which is connected by land-telegraph with Cooktown, and thus with Sydney, Melbourne, and Adelaide. From Adelaide the celebrated "Overland Telegraph," a marvel of Australian enterprise and public spirit, leads right through the arid desert-like interior of the continent to Port Darwin, and thence by cable *via* Java and India to England. Thus a telegram from Thursday Island to Europe has to cross the whole extent of the Australian continent from north to south, and again from south to north, ere it leaves Australia. Were it possible to wire from Thursday Island straight to Port Darwin, the greatest part of this roundabout way would be spared. Once only during my voyage did I send a telegram to Europe. It was directed from Cooktown to Berlin, contained six words and cost £3, and this did not encourage me to repeat the experiment.

The Thursday Island vegetation bears a chiefly Australian character, the light Eucalyptus bush predominating almost everywhere. The summit of one hill, however, is covered by a dense forest of a more tropical type, where I made good collections of beetles, butterflies, spiders, and other land-animals. Striking was the number of insects, both in the grass and on the trees. Some specimens were most brilliant in colour and design. On the whole, the tropical insects form a far more conspicuous element of the animal world than those of our latitudes, and enliven the landscape by making the bushes they settle upon appear as if covered by red blossoms.

I did not, however, find any land mammals on the island, and am therefore led to suppose that there exist none or next to none. It is easy to understand that kangaroos and other big marsupials cannot support themselves on these small islands, but I could not find a reason for the absence of the small flying marsupials and of the dwarf species, as, for instance, the bush-mouse. For them places like the Prince of Wales, Horn, Banks, and Musgrave Islands seem to furnish fitting haunts and abundant food. I feel by no means sure, however, that no kind of marsupial exists in these islands.

Had I camped out for some weeks or months on one of the small islands, I might have settled the question, but it is worthy of note that settlers who have been living on the islands of Torres Straits for many years deny the presence of land mammals in those parts.

There is no doubt that the Torres Straits Islands are remnants of a mainland formerly connecting Australia and New Guinea. The

breadth of the Straits at its narrowest part amounts to only 80 sea-miles, and its depth ranges from 5-10 fathoms. The sea to the west of Torres Straits is also very shallow. It is certain that the bridge of land, formerly connecting the enormous island of New Guinea with the adjacent continent, was much broader in those days than the narrow strip which now forms Torres Straits. Probably as the result of a subsidence of the land, the lower part of the former land-bridge now forms the shallow sea-bottom, while its hills and mountains rise out of the sea as a series of islands.

The former connection of the two countries is proved beyond doubt by a comparison of their animal inhabitants. The New Guinea fauna is decidedly Australian, both in a negative and positive way. On considering the disposition of the countries, one might think that New Guinea had been populated with animals from Australia, without having ever formed a part of this continent. Birds and many insects might have come through the air, using the islands of Torres Straits as resting-places. Other animals, as, for instance, the smaller mammals, might have been carried over by driftwood, or have crossed the insignificant stretches of sea by swimming. This kind of migration is, however, quite impossible in the case of marsupials like the wallabies, tree-kangaroos, and bandicoots, or of echidna, cassowaries, and many other animals, and the mere existence of these species on the Papuan Island suffices to prove its former connection with Australia. On the other hand, the admixture of Indo-Malayan types in the fauna of New Guinea is very insignificant, and of a kind which excludes the idea of land-connection between this island and the Indo-Malayan region within the Neozoic Period. New Guinea possesses one placental mammal absent in Australia, the wild pig, which has probably entered it from the Moluccas, or, still more likely, has been introduced by man. It is now represented in the island by two peculiar species.

In spite of the fundamental conformity between the character of the Australian and Papuan fauna, it struck me that those animals which are unable to cross the intervening strait, show distinctly-marked differences in details of their structure. It is true that New Guinea possesses but two genera of marsupials lacking to Australia, where they do not even exist as fossils: *Dorcopsis* and *Distoechurus*. Also *Proechidna*, a genus of Monotremata, is limited to New Guinea. The *species*, however, of the genera common to both countries, as *Macropus*, *Dendrolagus*, *Dromicia*, *Pseudochirus*, *Pera-meles*, *Dasyurus*, and *Phascologale*, are throughout different in some special points, and only very few species, like *Phalanger maculatus*,

Dactylopsila trivirgata, and *Petaurus breviceps*, are found on both sides of Torres Straits. Besides, *Petaurus breviceps* appears both in Australia and in New Guinea in two different varieties, and the same is the case with *Echidna aculeata*.

These facts appear to justify the conclusion that the separation of the two countries is not of recent date, but that it has existed for a considerable period, long enough to allow of distinct structural differentiation of certain forms north and south of Torres Straits. An investigation into some other elements constituting the fauna of both these countries, *i.e.* the study of the very characteristic birds, and of the reptiles, amphibia, insects, and land-snails, further supports this conclusion. Torres Straits and its surroundings may have still borne a narrow connection with New Guinea and the continent when the continental species began to vary, but we may rest assured that a broader connection between Australia and New Guinea has ceased to exist for a considerable period, and that it has been this circumstance, together with the differences of climate, vegetation, and the general conditions obtaining in both countries, which have led to the development of the more special among their varietal forms.

The relations between the fauna of two countries which have formerly formed one, but which have become separated by the sea, must necessarily depend on the age of this separation. Great Britain, which formed till about the end of the Glacial Period part of the European continent, both as to its fauna and flora, is almost identical with its neighbours Germany and France, although decidedly poorer than these. Moreover, we remark a total absence of any genera peculiar to Great Britain. Even the species of the existing mammals and plants are the same as on the continent, except perhaps some varieties or sub-varieties of Phanerogams. On the other hand, however, the British Islands possess three peculiar bird species (regarded as mere varieties by some naturalists), some freshwater fishes, and a number of original mosses and liverworts peculiar to themselves. It is further remarkable that a decided, if only slight, difference may be observed between England and Scotland on one side, and Ireland on the other, in all these respects. Whether there are some species of insects, of land- and freshwater-snails peculiar to the British Islands, has not been proved with certainty, but is most probable. At all events we see that even a relatively recent separation of an island from a continent will suffice to give its fauna and flora a peculiar type. This becomes still much more conspicuous in islands which have been severed from the mainland for a longer period.

The islands surrounding the Australian continent on its north, south, and east, furnish an excellent example under this head. Tasmania has probably been severed from the continent since the beginning of the Pleistocene Period; New Guinea has doubtless been isolated since a far earlier time; and, finally, New Zealand, since the appearance of mammals in Australia, has certainly been out of connection with those parts of the continent inhabited by monotremes or marsupials.

Tasmania, the last emancipated, shows in its fauna great agreement with South Australia and Victoria. Of *Echidna aculeata* we find the variety *setosa*. Of kangaroos the country offers no particular species, but four *varieties* peculiar to the island. *Dromicia* appears in the shape of a distinct species, *Dromicia lepida*, so does *Pseudochirus*, the Tasmanian species of which is called *Pseudochirus Cooki*. The common opossum, *Trichosurus vulpecula*, exists in the variety *fuliginosa*, the fur of which is particularly valued on account of its longer and denser hair, due to the cooler climate of Tasmania, which forces the animal to wear a warmer coat. Tasmania, further, possesses a particular wombat, *Phascolomys ursinus*, a particular bush-rat, *Phascologale minima*, and two genera of carnivorous Marsupials unknown to Australia; the marsupial wolf, *Thylacinus*, and the Tasmanian devil, *Sarcophilus*. It must not, however, be imagined that these two genera have originated in Tasmania only after its separation from the continent. They formerly lived also on the latter, where they, however, died out, and are to be found only in a fossil state. They probably succumbed to their better-armed competitor the dingo, which was introduced into Australia during the immigration of the blacks. Tasmania has never been entered by the dingo, and this circumstance has surely been the saving of its two big aboriginal marsupials, *Thylacinus* and *Sarcophilus*.

Nor does the avian fauna of Tasmania differ very much from that of the continent, save in its scarcity of species. This is denoted, for instance, by the absence of emus, mound-builders, and bower-birds. Tasmania does not possess a single indigenous genus, and of the species inhabiting the island only 10 per cent are peculiar to it, the remaining 90 being identical with continental forms. The difference in amphibians and freshwater fishes is no greater, and as to reptiles, Tasmania possesses neither a peculiar kind nor a peculiar genus of these vertebrates, its climate being too cool to be favourable to warmth-loving animals.

Thus we see that the Tasmanian fauna appears more distinctly different from the Australian than does that of Great Britain from

the fauna of the European continent; but that it is much less special than that of New Guinea, where some genera, and by far the majority of species, are entirely different from those of the Australian mainland.

If we finally turn to the two great islands south-east of Australia, to New Zealand, we find a fauna and flora of a decidedly Australian character. An extensive series of facts, which Alfred Russell Wallace has embodied in his admirable book *Island Life*, furnish a highly interesting picture of the history of this most wonderful island, distinctly proving its early separation from the country which at that period did not yet deserve to be called the Australian continent, but which formed an island situated east of the real Australian mainland. The latter consisted of the West Australia of our day, which at that time extended much farther to the south and to the west than nowadays, while the eastern island consisted of Tasmania, the whole Australian east coast, and parts of New Guinea. A broad stretch of sea separated it from the western continent. By a bridge of land, running from north-west to south-east, New Zealand was connected with this Australian island, and the latter with its north-eastern part, the north and middle parts of Queensland and New Guinea. The Norfolk and Lord Howe Islands are the last remnants of this bridge of land, the situation of which, up to this day, is marked by a submarine bank above the thousand fathom-line. These considerations prove how not only geology and oceanography, but how also the comparative study of plant and animal distribution may furnish the solution of many a riddle concerning the history of our planet.

One day some aborigines of Horn Island brought me a crocodile of more than 11 feet in length. It was not severely wounded, but so tightly fettered by ropes that I could touch and examine it quite at my ease. The natives had been watching it for some time, while it guarded its eggs, which were buried in a trough of sand, and had thus surprised and conquered the animal. They also brought me some of the hard-shelled eggs, which were the size of goose-eggs, and contained some developing embryos. I took the eggs, preserving some of the embryos and allowing others to develop further. The captured mother, quite resigned to her fate, was bought by the captain of a ship, and taken to Sydney to be sold there.

On the whole, I had little intercourse with the aborigines of the Torres Straits islands. Sometimes I met them dugong- and tortoise-fishing in their long, dug-out canoes, which possess two outriggers and carry a broad platform amidship. Once only, on Hammond

Island, called Keriri by the natives, did I become acquainted with a party of aborigines. Outwardly they are distinctly different from the inhabitants of the Australian continent, and my observations led me to consider them as mongrels between Papuans and Australians, and their habits and customs, made known to us by the investigations of Jukes and Macgillivray, and particularly by the detailed and extensive inquiries of Alfred C. Haddon, seem to show a peculiar mixture of Australian and Papuan characteristics. Haddon, who may be considered the foremost authority on this interesting race, and who has lived for years among them, is, however, of opinion that the Papuan element is by far the prevalent one, anthropologically and ethnographically, so that, taking all in all, we may well call the population Papuan. He has informed me that their hair is not of the Australian type, and their mental qualities are decidedly more Papuan than Australian; and that this became doubly evident to him on comparing them with the inhabitants of Cape York. The prevalence of the Papuan element, according to Haddon, is further shown by their artistic skill, by the use of dancing-masks at festivals, and of bow and arrow. The Australian throwing-stick, which is also used by the western tribes, has, according to their own assertion, been imported from Cape York. The eastern tribe have not adopted it at all. In short, Haddon's investigations have definitely proved these islanders to be Papuans intermixed with some Australian elements.

My visit to Hammond Island was in reality non-ethnological, since I was anxious to inspect a gold-mine, the discovery of which had, some years ago, occasioned a great rush. Since then the working of the mine has been given up as unprofitable. In some freshwater ditches near this abandoned mine I found a hitherto unrecorded genus of a freshwater snail, which Professor G. von Martens has since described under the name of *Pseudopotamis Semoni*. At the same time Martens described another species, related to the former, and found some years ago on Prince of Wales Island by Dr. O. Finsch, as *Pseudopotamis Finschi*. Here, again, we note the interesting observation that, in two islands hardly two miles distant from each other, and certainly connected formerly, isolation soon leads to specific divergences, a phenomenon particularly evident in freshwater- and land-snails.

I also paid a visit to the continent in my little cutter, a visit worth relating, since it brought me the most disagreeable night of my life. Starting from Thursday Island early in the morning we made little way, a north-western breeze which had raged the day

before having given place to a total calm, interrupted here and there by showers and squalls. Every squall drove us on a little, then again the sails flapped about the mast and we had to cast anchor, not to be driven back by the current. Thus we advanced bit by bit, sailing eastwards of Horn Island, whereupon we took a southward course, and, having passed Entrance Island, at last approached Possession Island, which lies quite near the continent. Here we anchored. During the night there fell torrents of rain and, our cutter being too small to permit of our sleeping below, we had to camp on deck, where every hour brought us a heavy shower, against which we did our best to defend ourselves by oil-cloth and sails. When the rain abated, we went to sleep; only to be awakened half an hour later by a fresh shower-bath. All this, however, was but the prelude.

The next morning we sailed along the hilly and wooded west coast of the continent, passing Paterson, where the Queensland telegraph reaches its northern limit and is joined to the Thursday Island cable. While I was staying at Thursday Island the telegraphic communication was interrupted for a considerable time, and for the following reason. In Paterson there lived three people — the telegraphist, his wife, and a clerk. One fine day the telegraphist was overcome by a fit of jealousy, and took up his gun, seeming dangerously inclined to make away with his assistant. The clerk, in order to avoid the attack, fled into the bush, his superior following him with murder in his heart, when, happily, the Government steamer *Albatross* came upon the scene, just in time to restore peace. The steamer had been sent to look after the three, as it was feared they had been murdered by blacks. The clerk, who timidly crept out of his hiding-place, was taken back to Thursday Island, while the happy couple made their peace with each other, and, perfect harmony being restored, continued their lonely life on this desolate post. In our time of "peace-gatherings" it is interesting to observe how three human beings, cut off from the rest of the world, cannot live at peace with each other.

Taking a south-western course we arrived at noon near the mouth of the Jardine River, and crossed its bar, assisted by the tide. This part of the country is flat and pretty densely wooded, the banks of the river are grown with mangroves, its bed full of shoals and sand-banks. We hoped, tide and winds favouring us, to get a good way up the river with our small and shallow boat. Soon, however, we stuck fast, then got free again, circumscribed a sandy shoal, stuck fast once more, got released again, then worked ourselves

up the river another hundred yards, when all at once we stuck suddenly and hopelessly in the soft river-bottom. Impossible to push the ship over the obstacle, equally impossible to draw it back into deeper waters! I told Wilson that I thought it best if we all of us jumped into the river, thus relieving the ship of our weight, and then pushed it on by our shoulders. This proposal was met by Wilson with the trifling objection that the mouths of these rivers generally swarm with crocodiles. However, there was no time to be lost. Already the tide had reached its height, and in half an hour every possibility of getting free would be at an end, and if we did not succeed at once, we should perhaps have to stick where we were for weeks, as the neap-tides were approaching. So we jumped into the river without heeding the mailed monsters which, as I had expected, left us unmolested, the greedy but cowardly brutes proving to be afraid of four noisy fellows working and shouting in the water. Our combined efforts succeeded in freeing the boat, but we had to give up every attempt to work our way up the river, and were glad enough to drift down into deeper water. Here we cast anchor on the left bank of the river, loaded the dinghy with our rugs and provisions and made for the shore, as I felt certain that this northern point of the Australian continent would furnish me with interesting observations and afford me material which would enrich my collections.

On taking a stroll in the neighbourhood, we found the remnants of a hut which had belonged to a missionary stationed there for some time. His work had not been very satisfactory, as his hoped-for congregation had preferred to wander about in the bush in a nomadic fashion, leaving their shepherd to sit by himself, "a lorn, lost creature." Their occasional visits were chiefly due to the tobacco of the good man, who experienced that it is easier to preach to the stones of the desert and the animals of the wood than to human beings of such gipsy-like habits. So, at last, he had given up hope, and had changed his quarters for a spiritually less barren ground. Near the hardly discernible ruins of this former missionary's dwellings stood some abandoned huts of very rough construction. They had been erected by the native police, who had camped here for a short time to execute some punishment on the blacks. We resolved to use these huts for the night, thus being spared the trouble of raising the little tent I had brought with me.

The rest of this day I employed in sauntering about the neighbourhood. The numerous swamps and stagnant pools covering a great part of this low alluvial land are surrounded by dense woods,

which were alive with water-birds, little kingfishers, ducks, and geese, and were even now, during daytime, conspicuous for the number of mosquitoes. On going farther away from the river and from the coast I found that the ground became firmer and drier. At the same time the abundant vegetation gave way to the light gum-tree bush so characteristic of Australia to its utmost northern point. I saw fresh cassowary tracks, but not, however, the bird itself, which seems to be more shy and wary than its southern relative the emu.

On the whole, the success of my ramble was trifling, so that, at six o'clock, I returned to my camp somewhat discontented and very tired and hungry, trying to drown the fatigue and worry of this last day and night in the delights of an opulent carouse consisting of tinned meat and tea. Already during supper the mosquitoes began to be a great nuisance, but I comforted my companions by telling them that I knew means to keep the little fiends at bay during the night, although we had neglected to take mosquito curtains with us. I meant to keep a fire burning in the entrance of our hut, so as to produce considerable smoke, which is best done by letting dry cow-dung burn to a coal. Failing this you can employ fresh twigs, but good care must be taken to keep up the fire and smoke all through the night. In this way I preached "wisdom" to my companions, who, seamen as they were, knew little of such things, but under the circumstances set to work with great enthusiasm, gathering wood and branches for our defensive fire.

We arranged the hut as a bedroom, made a good fire in both its entrances, and created an infernal smoke with our green branches. As soon as the atmosphere was sufficiently clear to enable one to breathe without being suffocated, I settled down to rest close to the smoking fire. Hardly had I lain a few moments, when I felt innumerable burning stings all over my body. I got still nearer to the fire—no difference. I covered my whole body, my face and hands with my blanket—the little devils stung and sucked right through it, as if the double woollen stuff, which made me melt with heat, had been nothing but a thin gauze veil. One of the sailors covered himself with the tent-cloth, with no better effect than my blanket. Another crept under the heavy sail of the cutter, and this was really of some use, the linen of the sail being too thick to allow the sting of the mosquito to pierce quite through. It soon, however, became impossible to remain under such a cover during that oppressive tropical night, just as impossible as to creep right into the flames, the smoke and heat from which seemed without the slightest effect on the millions of our assailants. Exasperated, we

tried to save ourselves by flight. We ran to the sea-shore—there they were, as numerous as ever and following us, as we tried to escape by wandering away from them for miles beside the sea. On board our cutter there was no improvement. The best course would have been to push off from the shore and anchor at some distance from it. This, however, was impossible, for it was low water and our boat lay almost dry. There was not a breath of wind, and the terribly sultry air lay on our tired limbs like lead. One slight relief indeed our flight had brought us; as long as we moved the little creatures did not sting, but as soon as ever we stood still or sat down to rest, thousands of pointed stings and greedy jaws were thrust into our skins. Thus our only means of escape was to walk up and down slowly but unceasingly, and this we did from seven o'clock in the evening till six next morning, all through a long tropical night. We had undergone great fatigue on both the foregoing days, and had hardly slept the night before. Now our feet would fain refuse service, but as soon as we rested for a minute, hundreds of venomous stings made us start again. Incessantly were we surrounded by dense clouds of the little animals, the bodies of which, when we moved, touched our faces, creating the sensation of a warm drizzling rain. One of my men, Charles Smith, a rough and weather-beaten seaman, had but that evening been boasting that a few miserable mosquitoes did not matter to *him*; he would just lie down and sleep. Now he jumped about in a frenzy, quite like ourselves. At four o'clock the moon rose, and just before six a light shimmer in the east announced the sun. Never in my life had I welcomed his friendly light with such joy as after this night. The mosquitoes continued to sting till about half an hour after the appearance of the sun, and only when the day was considerably advanced did they disappear in the swampy woods, happy to have discovered the four fools who came to camp in the swamps of a tropical river without mosquito curtains. The word mosquito is of Portuguese origin, and is employed as a collective name for all kinds of gnats (particularly Culicidae, Tipulidae, and Simuliidae). We might call our northern gnats mosquitoes, with the same right as the insects which sting us in Southern Europe or the tropics. It is true that the tropics, and in particular Australia (Sydney, for instance), boast several species of an uncommonly poisonous order, the sting of which evokes very violent itching. But the reason why they play such a great part in every tropical voyage is their much greater frequency in those regions. Swarms like those which attacked us near the Jardine River may render a country almost

uninhabitable. It is, moreover, known that this plague varies in the same place at different times, and it has happened that people, in the act of abandoning a settlement on account of their tormentors, have been surprised by their sudden and apparently inexplicable disappearance. Probably the state of the subterranean water and the varying extent of the stagnant swamps are the circumstances mainly influencing their occurrence.

Though more common in the warmer latitudes, great swarms of gnats are also found in the north, as for instance in Lapland and on the coast of North Siberia. In the lower Danube districts there appear in spring and summer great cloud-like swarms of an itching gnat (*Simulia*) the venomous stings of which, when they attack their victims by thousands, often lead to the death of cattle, horses, and even of human beings. This species being most frequent near the Serbian village Kolumbaez, it has received the name of *Simulia columbaeschensis*. In all gnats it is only the females that sting and suck blood.

My readers will understand that the adventures of this night did not make me desirous of spending another near the banks of Jardine River, and that I left those inhospitable shores as early as possible the next morning. After having dredged pretty successfully near the coast and collected marine animals on the reefs bordering the mainland, we returned to Thursday Island on the evening of the 26th of March.

This was the last sail I undertook in the little cutter *Mary Owen*, with Wilson and the two white sailors. I had by this time made up my mind to return in July 1892 to the Burnett, and wanted to spend the intervening time on a visit to New Guinea and a sail along the south-east coast of that island. For this expedition my cutter was too small and not seaworthy enough, and Wilson himself had not the nautical acquirements necessary to navigate a ship in those dangerous waters, which he had never before visited.

I had no difficulty in engaging another captain, a pilot who had been recommended to me as having for many years conducted the sailing-vessel of the English church missionaries in the waters south of New Guinea. He was described to me as slow and somewhat lame in action, but as experienced, reliable, and very cautious. He showed much readiness in accepting my proposal, and I cannot but own that he gave himself great trouble, and did all that was in his power to satisfy me. At the same time, however, his slow ways, want of energy, and exaggerated caution caused me many a disagreeable hour, many a sigh of impatience.

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Greater was the difficulty in finding a suitable vessel. As I wanted to engage a black crew, I thought it better to take a two-masted lugger instead of a one-masted cutter, the heavy sail of which would be more difficult to manage than the two smaller sails. We in due time found that a lugger, which seemed exactly to my wishes, was to be had on Thursday Island. This was a newly-built ship called *Hekla*, and belonged to a Norwegian mother-of-pearl fisher, Niels Andersen, who had his station on the Prince of Wales Island. Andersen asked £15 a month for his ship of 14 tons, besides desiring me to insure it. I immediately accepted his proposal, the sum being quite moderate considering the customary prices. There was some difficulty, however, in insuring the vessel. Sailing off the shores of New Guinea, fringed with coral reefs, washed by violent currents, and insufficiently surveyed as they are, is so dangerous that no company is anxious to insure ships bound for those quarters. At last Andersen declared his readiness to let the boat go uninsured, raising its price to £30 a month; and after some parley and further consideration, I entered upon his proposal. Meanwhile the man had discovered that his lugger was the only fitting boat then to be had on Thursday Island, and so he suddenly declared £30 to be too little. Mr. Mountain, who was kind enough to help me through this transaction, took the greatest pains to keep Andersen to his former bargain. The latter, however, laughed at my proposals, and making light of my difficulties demanded £40 to £50 for his ship. I put a stop to the business by declaring that I would take the lugger for £30, but not a penny more. Should I not get it at that price, I would give up my plan of going to New Guinea and devote my time to Northern Queensland. Andersen, seeing me firmly resolved, finally gave way and let me his boat for £30.

While I was occupied with the purchase of provisions and articles for bartering, and with the packing of my luggage and scientific instruments, the Resident Governor of Thursday Island, formerly Prime Minister of Queensland and Governor of New Guinea, the Honourable John Douglas, came to ask me whether I would mind taking his nephew, R. Sholto Johnston Douglas, with me to New Guinea. This young Scotsman was just then staying with his uncle on Thursday Island, being on his way back to Europe after a voyage to Australia and New Zealand, and he was eager to profit by an opportunity to visit the wonderful shores of New Guinea. As he declared himself willing to submit to my direction, and to respect the scientific character of the trip in every way, I consented.

to his proposal. There is always something of a risk in allowing a stranger to join in an expedition of this sort, and it is best for the naturalist to travel only with people who are in his service. I was lucky, however, in the person of my travelling companion, and Mr. Douglas's company greatly contributed to the enjoyment of my trip.

As a crew for our lugger we mustered three so-called Manilamen, aborigines of the Philippines. They proved good seamen and quiet and sober workers, who never got us into any scrapes with the New Guinea natives. Two of them were somewhat reserved and sulky : the third, whom we made our cook, was merrier and turned out quite an amusing fellow.

On the 4th of April we were ready to weigh anchor. We first touched at Horn Island to get our supply of firewood, and then, assisted by a kindly breeze, we started on our way to the shores of New Guinea.

CHAPTER XIII

NEW GUINEA FROM YULE ISLAND TO THE SOUTH CAPE

WHEN we set out for New Guinea at the beginning of April, it was in hope that the north-west monsoon would continue till the end of the month. Had this been the case, our little lugger would have shot like an arrow along the south-east coast of New Guinea, as far as the East Cape. At the end of April or the beginning of May the south-east trade-winds are wont to set in, than which no wind could serve us better for our return. The winds, however, were contrary, and blew most capriciously that year. The south-east set in earlier than we wished, and disappeared without giving warning when we most wanted it, leaving the field to its antagonist.

Subsequently to our setting out from Thursday Island we had a fresh south-east breeze, which was quite welcome to accompany us as far as the New Guinea coast, as we had to steer north-east to north as far as Bramble Cay.

To Bramble Cay we had to thread our way through a number of small, reef-bordered islands—Double Island, The Three Sisters, Coconut, Arden, Rennel, Marsden, Campbell, and Stephens Island—all of them hilltops belonging to the old north-eastern point of Australia now covered by the ocean. To the east the Great Barrier Reef separates them from the true Coral Sea. Stephens and Darnley Islands may be considered as the north-eastern points of the subsided extremity of the land, and to their east we perceive close to Anchor Cay the north end of the Barrier Reef. Between it and the more northerly-situated Bramble Cay a ship coming from the east will find an entrance to the Reef Channel, and subsequently to Torres Straits. This passage bears the name of Bligh's Entrance. To its south there is a second opening—Flinder's Entrance.

Most of these islands rise but little above the sea-level. Their

shores are bordered by silvery-white sand, a cluster of trees fills their centre, and single coconut palms, their elegant leaves fanned by the breath of the fresh sea-breeze, stand gracefully out from their borders. On the larger islands we saw some huts, settlements of the aborigines who belong to the eastern tribe of the Torres Straits islanders.

Navigation in these dangerous regions being very difficult, we were only able to get on during daytime, and had to cast anchor nightly. When sailing we used to draw a strong fishing-hook after us. It was attached to a line of the thickness of a pencil, and with it we hoped to catch some fishes for our dinner, which, without these, would have been limited to the more or less indifferent contents of our tins. This kind of fishing can be achieved without any special bait, other than a white rag fixed to the hook. Several times we thus caught bonitos and other mackerels, once an 18-inch shark, which, though of no edible value for our table, furnished me with some most interesting embryos for my collections. Once a bigger shark snatched at the hook gaily floating in the rear of our boat. The animal was held fast for a moment only, and then tore the rope as if it had been a bit of flimsy thread.

On the morning of the 7th of April we passed Bramble Cay, a narrow, sandy island rising only three yards out of the sea. It is covered by some scanty vegetation, and carries as beacon a rough sign-post, the head of which consists of a mighty rhomb of wood. "Cay" is in that country the name for a sandy island of this kind.

Thence we directed our course north-east to east, steering straight towards Cape Possession. We now encountered great quantities of driftwood, mighty disrooted trunks, which carried along with them among their towering roots great lumps of earth, and grass and plants of all kinds. These trees had been uprooted by floods and thunderstorms inland, had then been carried by the rivers to the sea, where they became the play of the currents. Circumstances favouring them, the seeds of plants so transported to distant lands may begin to thrive; and larger-sized fruits, floating on the sea, and enclosed in tenacious shells are thus able to reach distant shores. Any one who, like myself on this journey to New Guinea, has ever encountered such masses of driftwood will begin to understand the importance of this factor in the spreading of plants from country to country and island to island. It is one of the chief means by which oceanic islands, which have never been connected with any continent, may receive their vegetable, and even in part their animal inhabitants. Similarly, wind is

known to transport seeds furnished with a flying apparatus, or quite tiny eggs which may have mingled with the sand, while small eggs or seeds may sometimes cling to the feet of birds of passage. Driftwood, however, will carry small or even middle-sized animals clinging to the trunks and branches, or hiding in the lumps of earth torn up along with the roots of a tree; and this may perhaps explain the presence of the tree marsupial *Cuscus* (*Phalanger*) on almost all the islands of the Malay Archipelago (save the smallest ones) including Celebes, and likewise the distribution of the flying marsupial *Petaurus*, another arboreal animal. Probably this is also the manner in which several rodents have reached the Australian region, of which not one placental is an original inhabitant, and it is natural that this mode of transportation should act differently on various organisms and their seeds or eggs. Vegetable seeds with resistant shells do not suffer by being drifted about in the ocean for months together, not even by an occasional wetting with sea-water. Animals and animal-germs are far less resistant, and least of all can vertebrates and their embryos withstand a long voyage on driftwood. An exception to this rule is offered by reptiles (not to speak of turtles and crocodiles, whose nature it is to swim). They have representatives on all the oceanic islands where these are entirely devoid of mammals, even of rodents. Amphibians extend as far as the New Hebrides and Fiji Islands, formerly connected with New Guinea by way of the Solomon Islands and the Bismarck Archipelago, but they do not reach any farther into the South Sea, and freshwater fishes of these islands are marine immigrants.

During the two last days of our passage the wind blew quite irregularly, now from the south-east, now from the north-west, changing to periods of total calm. To while away the time, Douglas and I practised shooting, taking the driftwood swimming past our ship as our target, using among others some Snider rifles, which the Government Resident had given us for defence in the event of attack by the aborigines. The night was generally accompanied by violent thunderstorms, with heavy gusts of rain, which made us retire from the deck into the tiny cave-like cabin, which we shared with our captain.

Generally wind and rain became so violent that we had to close all the hatchways below, whereby the air became suffocating. Besides, we suffered from painful stings on our necks, hands, and feet, which, during the first days, and as often as we used to anchor near to wooded islands, we attributed to mosquitoes. Soon,

however, we found out that our cabin harboured a colony of bugs, which were very hard to capture, as they knew how to hide themselves deep in the slits and cracks of the wood. It is very rare that bugs are found on board a ship which has been on the sea for some time. The humidity of the atmosphere, which gradually moistens the wood deep into its finest crevices, and pervades even the most sheltered nook, does not agree with these insects, which are sworn enemies of moisture. Another pest quite domesticated on shipboard is the cockroach, *Periplaneta orientalis*, and the seamen assured me that the bugs which sometimes appear on new ships disappear as soon as these insects come on the scene. I cannot confirm this statement, which seems to me the more improbable, since cockroaches feed principally on vegetable substances. After some weeks the bugs disappeared from our boat, I am happy to say, and cockroaches kept altogether aloof.

On the morning of the 9th of April, we saw just before us a high chain of mountains, the range of which was crowned by an isolated peak of bold shape, jutting out proudly from the rest. It was Mount Yule, the summit of which attains a height of more than 10,000 feet, and as a far-visible beacon welcomes those visitors to New Guinea who approach the island from the west. A favourable wind bore us to the shore at a lively speed, accompanied by a school of about 100 dolphins, which kept up with our ship for several hours. Sometimes they swam in full array, three or four of them abreast, to the right and left of our boat, sometimes also in front of it, apparently as if a zeal and loyalty actuated them to keep pace with us. Then, again, they fell into a more playful humour, jerked themselves a few yards out of the water, the wildest among them turning real somersaults and behaving exactly like merry frolicking boys just free from school. All at once they seemed to have had enough of this joke, and began to loiter, followed us once again, and then left us for good.

As soon as the vicinity of the coast allowed us to see more clearly, we observed that the distant chain of mountains is preceded by a number of low, hilly ranges, and that between these hills and the sea lies a broad and flat expanse of shore. The farther one goes to the east the narrower this level band becomes, and on the east coast of the island the steep mountains descend towards the sea most abruptly.

It was getting dark when we anchored in the Hall Sound, situated between the island of Roro (Yule Island) and the continent. At the same time a thunderstorm of incredible violence broke out,

which prevented us from setting foot either upon the island or the continent of New Guinea.

On the next morning the sun rose in a cloudless sky, and the air was fresh and serene. High over the wooded plain and the more distant hills towered Mount Yule, its proud summit wrapt in a veil of bluish mist, and further eastward we discerned the imposing range of Mount Owen Stanley, whose height of 12,000 feet may compete with our proudest Alpine summits. Snow is indeed wanting on these peaks, but it must be remembered that they lie but 8° to 9° south of the equator. In the German part of New Guinea we find a still higher mountain, the Otto-Berg, the highest peak of the Bismarck Mountains, which is said to attain a height of 16,000 feet, and it is very probable that the saddle between its two points carries some snow. The ranges of Mount Yule and Owen Stanley principally consist of metamorphised slate, which merges into gneiss near Mount Victoria. Towards the foot of the mountains we also find slate and sandstone. Besides granite also younger eruptive rocks, like basalt and andesite, are found in great quantity on Mount Yule, the tooth-like summit of which seems entirely to consist of andesite.

While we were still occupied with taking our daily bathe in the blue sea, some aborigines in canoes came alongside our ship, and here it was that I first made the acquaintance of Papuans, a race as interesting and peculiar as their home, which Nature has more lavishly endowed than any other tropical island, than perhaps any other country in the world. It always appeared to me as if this character of the land was reflected in that of its inhabitants; so lively a people are they, so merry, so gorgeously adorned, so brilliantly decorated, and so very different both from the primitive blacks of Australia, who are so entirely devoid of artistic sense, and from their south-western neighbours, the serious reticent Malays.

Laughing, and with lively gesticulations, the vigorous and well-shaped figures of the few whom we permitted to enter our boat, thronged around us. I was struck by the brownish hue of their skin, which marks out the inhabitants of this special part of the New Guinea coast from the darker tribes living in the east and west. The upper part of their body is generally of a powerful build, their shoulders broad, and the muscles of their chest and arms very vigorous. The legs, however, especially those of the men, are long and thin, and I never observed any with well-developed calves. The cast of their features is so peculiar that a practised eye can

discern the Papuan immediately, not only from every Australian, Malay, and typical Polynesian, but also from every Negro. I think it, however, a duty to mention that D'Albertis, who, having lived for many years amongst them, is perhaps one of the first authorities upon New Guinea and its inhabitants, is not of my opinion. During his return from his celebrated journey his ship was wrecked on the Somali coast, near Ras Hafun, and this is the description he gives of the aborigines of that coast. "We met with several natives who told us they were Somali. Who will believe that in these people I seemed to be renewing my acquaintance with the natives of New Guinea, especially with those of Torres Straits! Such is the impression they made upon me. I observed the true Negro type, which differs from them in many respects; but if several of these natives were transported to New Guinea, they might be mistaken for aborigines of that country—those with the receding forehead, aquiline nose, and moderately thick lips, who have curly but not woolly hair. They belong to the type I called Arab, when speaking of the Papuans of Moatta and Tawan, the type which, although not predominating, I have often found in New Guinea, and I discover them to-day on the shores of Ras Hafun. Those I saw to-day remind me of the inhabitants of Prince of Wales Island. There are varieties of colour, but the type I have observed is the same. This discovery is of such interest to me that I cannot regret the chance which stranded us on Ras Hafun shores."

A common feature of the Negro and the Papuan consists in their curly, or, as it is generally termed, *woolly* hair; but on closer consideration we find a marked difference between the hair of the two races. Instead of showing the irregular spiral twist of the Negro's hair, which forms an uneven and tangled mass, the Papuan's hair grows in very marked but regular waves. Its windings lie on an equal level, so that in reality it has a greater likeness to sheep's wool than the Negro's hair. Just as great is the difference between the woolly hair of the Papuan and that of the Australian and Polynesian, which is not really curly but only wavy. The cranium of the Papuan is decidedly dolichocephalous, thus showing a marked difference to the mesocephalous Polynesians and the almost brachycephalous Negritos. It is relatively small, with projecting jaws and very broad cheek-bones, so that the face sometimes presents a longitudinal oval. As the forehead generally gets narrow towards the top, and the chin is not very broad, the result is a most characteristic physiognomy, broad in the middle and pointed above and below, as may be seen on many faces in my photographs. The mouth is

broad and full, though the lips cannot be described as really protuberant. The noses are generally low and somewhat broad at the root, but I never saw such broad-saddled noses, nor such transverse nostrils as in Australians. On Yule Island I was struck by some individuals whose noses were aquiline, reminding one distantly of the Semitic type. Missionaries who had visited the north coast of New Guinea told me that this peculiar shape of nose was very frequent in those parts.

The bodies of the Papuans are rather hairy, but I have never seen a bearded Papuan, as they pull out their beards very carefully as soon as they appear. The same operation is frequently performed on the eyebrows. Most surprising, however, is the development and the elaborate dressing of the hair of the head, which crowns the latter like a stately crest, falling over at the sides and forming a splendid ruffled mane. Great trouble is taken with its arrangement and decoration. It is trimmed with feathers and kangaroo tails. Combs, destined rather for scratching than cleaning the head, serve to keep the parasitic inhabitants of this wilderness in due order. The hair of the girls is always shorter, and after marriage the women of many tribes have it cut quite short, or even shaven off. The men give up their hair only if taken seriously ill. On the eastern extremity of New Guinea, the hair, as a rule, is worn shorter, and one misses the proud manes which might be an object of envy to many a pianist.

Yule Island, called "Roro" by the natives, has been thoroughly explored in 1875 by the Italian naturalist and traveller, L. M. d'Alberty. He lived among its inhabitants for a considerable time, and then laid down the experiences of his perilous but scientifically productive stay in his very interesting and well-written book, *New Guinea*. It was probably owing to his descriptions that some Catholic missionaries of the society "Le Sacré Cœur de Jésus" chose the rich and well-populated country traversed by the St. Joseph's River for their first field of action, taking the little island itself for their headquarters. This choice was the happier in that the Hall Sound between island and continent forms an excellent and sheltered port.

The Catholic Mission in New Guinea consisted at the time of my visit of the Archbishop Navarre, of the Bishop Verjus, who was then absent and has since died in Europe, of twelve fathers and brothers, and of seven sisters. The "fathers" are ordained ministers; the "brothers," lay-brothers, each of whom was expert in some trade or other. The members of the order speak French

among themselves, and also the direction of the Station is in French and Italian hands, though the brothers are for the most part of Dutch and German origin. On Yule Island the Mission has extensive buildings and a handsome church.

When Douglas and I came on shore, we were very kindly and hospitably received by the Archbishop and the other clericals. It happened to be Palm Sunday, and most of the members of the Mission had left their stations on the continent to come to Yule Island and take part in the celebrations of the day. It was a striking contrast to see the missionaries in their severe robes and the sisters in the white and blue of their flowing garments, walking to church in solemn procession, amidst the tropical scenery of this wonderful island, surrounded and stared at by the uncanny figures of the dark-maned swarthy savages.

During the religious ceremony I undertook an excursion to the wooded hill rising behind the missionary station, picking up numerous insects and some fine lizards among the light shrubs growing there. Gigantic butterflies of brilliant hue flew about amid the foliage of the higher trees, too high up, however, and too swift of flight to allow of my catching them with my net. On the way back I suddenly found myself on a wide plain, covered with grass several yards high. At first it was not very dense, so that I was able to make a way for myself through the blades, but soon it became quite impenetrable. To get into a grass-forest of this sort is one of the most unpleasant experiences of the tropics. The sultriness is suffocating, no breath of air being able to enter into that dense maze of grass. You can neither squeeze yourself through, nor tread the blades under your feet, as they are too strong and too stiff. Extensive plains of New Guinea, Timor, Java, and particularly Sumatra are covered by these grass-forests, consisting of *Saccharum spontaneum*, which attains a height of 9-12 feet, and *Anthistiria mutica*, or *Imperata arundinacea* (the notorious Alang-Alang grass), and of different species of *Scirpus* and *Cyperus*. None of these tropical grass forests, however, equal in extent and in viciousness those of the renowned Australian porcupine grass or spinifex (*Triodia irritans*), found to the north and north-west of Lake Eyre, where, through 10° of latitude, it covers hundreds and hundreds of miles.

After having extricated myself from this grassy labyrinth, I returned to the missionaries' station, almost boiled with heat and scratched all over my body. Here we had dinner with the missionaries out of doors, 'neath a shady verandah. After dinner, Mr. Douglas and I went with one of the missionaries, called Brother

Joseph, to see the two little villages, which lie more than half an hour north-west of the missionaries' station on the west coast of the island. The name of the first village is Siria, that of the other, close by, Ireirina, *i.e.* collectively Roro. Both these villages are situated close to the sea, though still on firm land, and are surrounded by plantations of coconut trees and bananas. The houses stand on the tough and solid but ugly and crooked trunks of the mangrove, and the floor of the "sitting-room," consisting of stems laid side by side, is situated at least 3, generally 6 or 9 feet above the ground. This is wise from a hygienic point of view, living and sleeping directly above the ground being very dangerous in a damp tropical country, as the parts of air close to the ground are those most impregnated with the dangerous malaria germs. Besides, this way of building furnishes a defence against the mosquito plague, for, when these insects become too tormenting, the people need only light a fire below their hut, and the smoke which results will drive the insects away. Less laudable, from a hygienic view, is the custom of burying their dead immediately below the house. Some of the houses are left open at the sides, and are protected by nothing but the projecting roof. Others possess light walls consisting of matted grass and rushes, or of palm or reed leaves joined together in rough layers. The roofs of the houses are constructed in a similar fashion, the leaves of the nipa palm being in many parts of the country used for this purpose.

The aborigines of Roro did not take much notice of us, as they are so used to the presence of the missionaries as not to regard the "white man" as wonderful and interesting. Moreover, their attention was occupied with guests of greater interest, a large commercial canoe or "lakatoi" having just put into their port.

It is very interesting to observe how people, standing like the Papuans at a low level of civilisation, have already developed a rational and well-considered system of barter. In the swampy lowlands near the western half of the Gulf of Papua sago palms grow wild in great quantities, furnishing an inexhaustible store of food for the aborigines which is wanting in the eastern part of the island where the mountains decline steeply towards the sea. Instead of this, many places of the east possess certain kinds of clay suitable for the making of earthenware. The natives of these parts, or rather their wives, are mistresses of the art of pottery, and in the manufacturing of pots and dishes of all kinds. The men, however,

do not deign to occupy themselves with this sort of thing. After having been dug the clay is dried, then pounded, mixed with fine sand and kneaded with water so as to form a soft dough. Out of this mass the pottery is shaped and finally burned in a good fire.

The places most noted for the manufacture and barter of pottery are Teste Island and the south-east point of New Guinea, Aroma, Hanuabada (Port Moresby), Manumanu, and Delena (opposite Yule Island). Above all, it is the tribe of the Motu, who, intermixed with the friendly tribe of the Koitapuans, inhabiting Port Moresby and its environs, are renowned for the dexterity of their women in the manufacture of pottery, and for the spirit of enterprise shown by their men in the bartering of these articles. Taking advantage of the south-east trade-wind, they convey their ware hundreds of miles to the west to districts productive of sago, whereon, as soon as the wind verges from south-east to north-west, they return to their country, richly laden with the produce of the west.

These long and sometimes rather dangerous voyages are undertaken on peculiar crafts called "lakatoi," one of which I saw near Roro, and have depicted on the following page. Another "lakatoi," in full sail, is represented on p. 345.

Although the aborigines of this part of the New Guinea coast are good fishermen, sailors, and shipbuilders, their naval architecture has not yet risen above the stage of the dug-out canoe. Whenever they need vessels of a greater compass than can be afforded by the dug-out, which of course is always narrow and unfit for the transport of wares, they resort to combination instead of creating a new type. As is seen in my photograph, several large dug-outs, sometimes three or even more, are laid close alongside each other and tightly joined. Then a platform is erected and fixed in the middle, right across the bodies of the canoes, and its sides protected by mats of nipa palm, sometimes interwoven with dried banana leaves, to give them greater solidity. At the front and back covered partitions serve for protection against rain and spray. The whole is surrounded by a sort of framework, which may be seen in the photograph, and which takes the place of an outer deck, while the masts generally consist of two mangrove trunks fixed near each other in the middle of the boat. On the lakatoi of my photograph they had been removed, but they are represented in the illustration on p. 345. Here we also perceive the fantastic shapes of the mat-sails, one to each mast, the bold yet graceful outline of which does honour to the artistic sense of the Papuan, the more so as a nautical advantage cannot be attributed to their

Lakatoi on the Beach at Siria, Yule Island.

peculiar contour. The ropes consist of twisted or platted bast and the anchor-rope of rattan, which excellent material is, however, less in use at New Guinea than at the Malay Archipelago, where it is universally employed for such purposes. In the St. Joseph district it is regularly used for bow-strings. The bamboo plays a far less important part with the Papuans than it does, for example, with the Dyaks at Borneo. The latter have a particular predilection for this building material, which they employ for bridges, houses, cages, water-pipes, for cooking and for all sorts of other purposes. In New Guinea it is principally used for tobacco pipes, ornamented with patterns as represented on p. 397, and for the manufacture of arrow-shafts, the bow being more frequently made of young palm-stems than of bamboo. And, lastly, a piece of bamboo split into two serves as a beheading-knife to cut off the head of a dead enemy. The edge of the wood, which is strongly impregnated with silicious material, is as sharp as any razor, thus fulfilling all the purposes of a steel blade the advantages of which the Papuan is only just beginning to learn from the whites,—for the Papuans, although of far higher culture than the Australians, are, like the latter, children of the Stone Age, understanding neither the treatment of iron nor of any other metal. The circumstance that the rattan-palm and bamboo are less universally employed in the south-east of New Guinea, must be attributed to their greater scantiness in these parts compared with their frequency on the Malay Islands and Moluccas. The same may be said of the sago palm, the leaves and fibres of which form the most important building material on the Moluccas, as I had occasion to observe during my stay at Amboyna. In the sago districts of the Gulf of Papua, however, the sago-palm leaf is used for building purposes.

The above-described lakatois are loaded by the Motus, and packed carefully with the pottery shaped by the clever hands of their womenfolk, and with bracelets cut out of the shell of *Conus generalis* (a snail-like mollusc common in the east of the island), not nowadays altogether unmixed with articles made in Europe.

In September or October the south-east trade-wind conveys the lakatois to the west, and three or four months later the north-west monsoon carries them back. These expeditions extend far to the west of the Gulf of Papua, to Motumotu, Kerema, Vaitala, and Mipua, near Bald Head. Here the wares are sold for sago, and a month is spent in sweet idleness, and with carousals and merry-makings of all sorts. Soon, however, these give way to a time of hard work, since the western districts yield splendid timber, growing

all along the banks of their rivers, which is eminently suited for the manufacture of canoes. The clever Motus fall to work, felling as many trees and hollowing out as many canoes as are wanted to transport their sago home, and thus every lakatoi carries back alongside itself a number of newly-built canoes loaded with sago, and it is often six months, ere the bold mariners return from their commercial enterprise.

Of late the western tribes have commenced to imitate the eastern. They sail to the east towards the end of the north-west trade-wind, and, after selling their sago for knives, tobacco, and pots, return with the early south-east wind. They are, however, not by far so enterprising as the valiant Motus.

We tried to purchase some of the bows and arrows lying about all over the platform of the lakatoi, but our advances in that direction were rather coolly treated. On the whole we had a somewhat sullen reception, and I experienced some trouble in inducing the men to arrange themselves in a group and stand still to be photographed. At last some pieces of tobacco proved more successful than all my kind words and entreaties. These men, who, as we heard, came from Motu-Motu, surpassed the inhabitants of Yule Island by the tall and slender build of their bodies and by the darker colour of their skin.

After our return to the missionaries' station, the Archbishop introduced us to the Sisters, who, led by a *mère supérieure*, assist the men in their hard and dangerous mission work. They were mostly French, and one only of German Alsatian origin. In the company of the Sisters I perceived a pretty little girl of a light brown colour, the daughter of a white, George Hunter, who had been murdered by his wife, the mother of this child, a native woman. Hunter had been Government Officer in the Rigo villages lying east of Port Moresby, somewhat inland from Kapakapa. His wife, who had lived with him for many years, had got tired of him, and wished to marry an aborigine who was her lover. The latter, in company with three other blacks, made away with her husband, at her bidding, taking advantage of his lying in bed with a slight fever. This rendered the man unable to reach his gun, which they feared more than himself, and so gave his murderers power over him. The woman took the corpse herself to Port Moresby in a canoe, playing her part so well that nobody had any suspicion of the truth, and Hunter, who was believed to have fallen a victim to the climate, was immediately buried. It was many months later that the rumour of his having been killed by

force reached the ears of the whites. Ultimately the culprits confessed. The men who had committed the murder were executed ; the woman, as the originator, though not performer of the deed, was sentenced to compulsory labour for life. The little orphan was taken care of by the kind Sisters, who kept from the graceful child the knowledge of her parents' terrible fate, so that the look of her clever eyes remained ingenuous and trustful.

The night we spent on board my lugger.

On the next morning Brother Joseph came in the missionaries' whale-boat to take Mr. Douglas and me for an expedition up the St. Joseph's River. A whale-boat is a long and open keeled boat, the stern-post of which is constructed like the prow. It derives its name from being employed for whale-hunting, but it is exceedingly useful on tropical coasts, being available for sailing both on the open sea and on rivers, and fit to be propelled either by sails or oars.

This whale-boat was rowed by four natives, who, however, were not over dexterous in the handling of the long European oar. Nearly all savage nations prefer their paddles, which they manage with both hands, to our oars, and keep to their primitive and less effectual mode of rowing, even where they live in close intercourse with white men. The reason is that a narrow dug-out is in fact more easily guided by a paddle than by an oar, and hardly suitable to the lever-like action of the latter. I myself experienced this often enough when rowing about on the Burnett and its tributaries with my self-made fishing-boat. Besides this, a flat canoe is much more useful for tropical rivers than a deeper-going European keeled boat.

At first we sailed along the north-east, closely-wooded coast of the island, which in these regions consists of strongly contorted strata. A great crocodile, which had been basking on the shore, at once precipitated itself into the sea and disappeared from sight. These monsters are common in Hall Sound and in the mouth of the St. Joseph's River, where they are known to be exceedingly audacious and greedy. After having reached the north point of the island, we directed our course towards the continent, landing near a small Papuan village Pinupaka, having about a hundred inhabitants. Here there had been living for some years, a Catholic missionary, Brother Johann, a Bavarian from Eichstaedt, who, however, appeared still unfamiliar with the inhabitants. He complained very much of fever.

The houses of this little village are very carefully built in a

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Marea in Pinupaka.

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somewhat fantastic style, pleasing to the eye in its capricious variations. Here we find low, rectangular family-houses closed all round by matting, leaving open only the entrance which is flanked by a platform. There are larger houses standing on posts 20-25 feet high, and showing different shapes, most frequently that represented on the accompanying photograph. They are called "marea," and serve as living and sleeping-houses for the bachelors, as club and assembly-rooms for the men in general, and as temporary lodgings for strange visitors. Women are strictly forbidden to enter the marea. Here we find trophies and weapons hung up or spread out to view. The posts are finely carved, and bear patterns representing birds, lizards, and human figures. The "marea" of this country exactly corresponds to the "elamo" of the tribes living to the west near the Gulf of Papua. They are not, however, considered hallowed like the latter, which may well be called sanctuaries of Semese or Howaki, of whom I shall speak later on. The mareas are flounced by a platform on which, on festive occasions, the natives kill their pigs and dogs and take their meals. On passing to more eastern parts of the coast, we find tribes who, although they do not build the marea houses, still erect the platform, which is considered holy ground and is generally borne by three or four high posts, covered with carvings and adorned with skulls and other trophies. They are called "dudu" by most of the tribes from Port Moresby to the South Cape, and by some others "lubu" or "rubu."

The unmarried men on the St. Joseph's River are subjected to a severe ordeal. As soon as a boy becomes adolescent, his initiation is celebrated with solemn rites, and he is received into the marea, which is henceforward his abode. His waist is encircled by a tight girdle or "havuri," which gives his figure a funny and uncomfortable appearance of being too tightly laced, so that this child of nature bears a striking resemblance to a wasp-waisted *mondaine*. The young fellows are under the guidance of an older man, who exercises a sort of authority, and whose drum is their signal of assembly.

According to the assurances of the missionaries, the natives of the St. Joseph's River observe great moderation in their intercourse with the female sex, which cannot be said of the tribes living on the more eastern parts of the coast. The men and adolescents clothe their pudenda in a kind of bag of close network. Farther east, for instance at Hula or Aroma, we find the curious custom that the men, instead of hiding this region from view, tie it up by a ribbon

passing between their legs and fixed to their girdle before and behind. They consider it indecent to be seen by women without this ribbon. Still farther east, for instance at Milne Bay, we again find the custom of covering the pudenda by broad bands of bast attached to the girdle. Women and girls, down to the age of six or eight, wear short petticoats of grass or of coconut fibre, reaching almost to their knees.

After having remained at Pinupaka some hours, we once more entered our whale-boat. At first we directed our course to the south-east, sailing along the coast till we had doubled the narrow tract of land on which Pinupaka lies. As the breeze was very faint, we were again obliged to row, and this so much annoyed our new crew from Pinupaka that they accompanied every stroke of their oars with grumbling and angry words, showing great disrespect towards good Brother Joseph. The worst of the party was one uncomfortable-looking, nasty young fellow, adorned with an abundant mane of hair. He seemed to use very ill language, and abused us in so coarse and noisy a fashion that the missionary finally lost his patience, and threatened to withhold the small present of tobacco, which the men expected to receive, which threat seemed at once to turn his wrath; luckily at the same time some wind arose to fill our sails. Soon we approached a part of the coast, where an indentation in the shore covered with mangroves seemed to announce the mouth of a river. In fact, we found ourselves opposite to a water-course, the Poino Creek, which runs some distance into the land. Its mouth is marked by a real bar, which is difficult to pass if the sea is at all rough. The creek contains salt-water even at ebb-tide, but the existence of the bar denotes that at times river-water flows into the sea, thus heaping up sand before the entrance. I incline to the belief that this Poino Creek is nothing but the remnant of a western branch of the estuary of the St. Joseph's River, which still communicates with the stream in times of inundation.

Darkness was setting in when we rowed up the narrow, winding creek, the banks of which are densely grown with mangroves and palms, which, in the dark of falling night looked a thousand times more weird and mysterious than by daylight. Silence reigned over the heavy masses of foliage and over the waters of the creek, the shores of which were wrapped in impenetrable darkness by the crowns of trees and the climbing plants abounding everywhere. Here and there the universal stillness was broken by the cry of a night-bird. The chattering of my black companions had ceased, and they continued their work silently and steadily, with only a word

here and there as to the steering of the boat or an obstacle in the way of our little craft.

I think that among all the tropical scenes I have witnessed, these narrow river-dales, crowded as they are with a dense and luxuriant vegetation, are among the most characteristic and beautiful, owning a charm quite peculiar to themselves. Besides furnishing us with an insight into the nature of a primeval forest, they possess the grand advantage of water, which enlivening element is, in my opinion, a necessary feature of any truly beautiful scenery.

A journey on a tropical river of this sort, apparently buried in vegetation, conveys to a northern traveller impressions of a kind hitherto unknown to him, the beauty of which is as incomparable as it is difficult to describe. The charm of the scene is still further enhanced when evening spreads her veil over forest and water, and the moon sheds her bright but never dazzling rays over the whole picture. Among all my travelling impressions these nocturnes are the most lasting, be their scene the Australian bush, the forests of New Guinea, or the coast of the Moluccas.

How different, however, is the effect produced by the same surroundings on various persons, the general image, the general impression left on different minds bearing quite a different character. D'Albertis, who once spent a night on a similar creek, the Bioto, only a few miles east of the Poino Creek, describes his impressions as follows:—"One may pass the night in a small canoe on a little river, but sleep is impossible; such a night is terrible, and one can only contemplate it with horror. The cries of strange animals, the danger from crocodiles, perhaps from natives also, the fantastic appearance everything assumes, the fluttering of myriads of *Pteropus*, passing overhead like ghosts, the very murmuring of the stream, all combine to make of the place a small inferno. If Dante had ever passed a night like mine on the Bioto, he would certainly have added all I went through to the torments of his 'Hell.'"

This was written by D'Albertis, who, in the face of real danger, has ever shown a lion's courage. It must be added that, during the night of which he speaks, he was plagued by mosquitoes, and he would have been right, indeed, in saying that Dante might have added the stings of these insects, as I had to endure them on the Jardine River, to the torments of his "Inferno." The other things he describes as so terrible, appear to me but objects of scientific interest and æsthetic admiration.

It was eight o'clock in the evening, two hours after sunset, when

we arrived at the landing-place of the village Mou. Thence a short way led us to the neighbouring missionary house, which was at that time inhabited by Father Louis Hubert from Bourges and two Dutch Brothers. These two were practised carpenters, and just then employed on the erection of a church, trying to adapt their European building system to the material of that country. They told us how they had learned a good deal from the aborigines, but that these did not care to become acquainted with European methods, and hardly ever adapted any of their contrivances.

We now settled down for a late meal on the verandah of the missionary house. During it we greatly suffered from the numerous mosquitoes, whose sting seems to be of a particular virulence in these quarters. Still worse was the night. It is true that our beds were furnished with mosquito-curtains, these, however, had not been kept properly closed during the day, so that we were molested with a numerous company of thirsty blood-suckers all through the night. Better no curtain at all than one which keeps you imprisoned with your enemies as in a cage. It is not enough that a mosquito-curtain be dense, it must also be kept quite drawn during daytime, else the insects, attracted by the human atmosphere adhering to the bed, settle in its folds and await the appearance of their victim at nightfall. This plague had formerly been so violent at Roro that the Fathers had thought of transferring the station to another place. One of the missionaries told me, in a very lively and humorous way, how they had had to defend themselves against the little foes all day long, being obliged to kick and struggle with arms and feet to get rid of them, even when reading mass or performing other solemn rites. By and by, however, the plague abated from reasons unknown, though I still thought it quite bad enough to embitter any one's life by robbing him of the enjoyment of those charming evening hours, which, in the tropics, are doubly delightful after the heat and exertions of daytime.

On the next morning I repaired to the village of Mou accompanied by Father Hubert, and was again surprised by the beauty and variety in the style of the houses. The Mareas particularly aroused my admiration through their stateliness and their rich decoration with weapons and trophies, in the arrangement of which it seemed that the aborigines had concentrated all their skill and art.

I saw splendid stone axes, finely painted shields, carved wooden knives, decorated spears and arrows, pretty spoons of coconut shells, and calabashes with graceful patterns burnt into the surface, all denoting a delight in colour and form such as I have never

observed in any other race. The objects are wrought by the most simple tools of shell and stone. Still the workmanship is of an excellence worthy the highest admiration and respect of any European artisan, and that doubly so as being the production of so primitive a race. I only once saw a more complicated instrument—a real gimlet, the point of which consisted of a sharpened stone, set in a wooden drill-stock which could be twirled by threads of bast fixed to a sort of bow. This instrument seemed an invention of the natives, of which they were so proud that they could not be induced to give it us in exchange for a considerable amount of tobacco and coloured beads, not even for a knife. This single instance excepted, I had no difficulty in procuring myself any number of their handsome weapons, axes, ornaments, and tools in exchange for tobacco, which article seemed so very rare in those parts, that the aborigines were always ready to give up the most elaborate pieces of workmanship for a little bit of the black compressed tobacco of horrible quality, which formed our chief article of trade.

Next to betel, tobacco is the chief delicacy of the New Guinea aborigines. It had been cultivated by them long before the entrance of the whites. Their pipe, here called "*ireire*," farther east "*baubau*," consists, in the whole south-eastern part of New Guinea, of a segment of bamboo cane bearing two septa, and of the thickness of a fist. (See the illustration on p. 397, Figs. 8-11.) One of the partition walls is left whole, but in its vicinity the cylindrical stem is perforated, and into the opening a little cornet made of a leaf and containing the tobacco is inserted. The other partition wall is pierced by a hole to which the individual smoking flatly applies his mouth, thus drawing in the smoke. From time to time he will take the little cornet out of the opening, and imbibe the smoke filling the interior of the cylinder. So the pipe goes round among the assembled company, every one in turn taking a draught. I have even seen children taking part in this.

Close to Mou we found the villages of Miori and Erine, which we visited likewise, and which, like the former, were conspicuous for their handsome houses and the pleasing disposal of the dwellings which formed a sort of street. Everywhere the natives appeared somewhat sulky, answering the kind greetings of the missionary reluctantly and with sour looks. Here and there conversations took place between them and Father Hubert, which bore a not too friendly character, and according to what the Father told me afterwards the following interesting event was involved.

As I have already mentioned, the aborigines of these parts follow the unpleasant and unwholesome custom of burying their dead directly under their houses. Besides this there are still observed a number of nasty and obnoxious mourning customs. The closer relatives of the deceased sleep for weeks and months near his corpse, which at first is deposited in a special dead-house. They besmear themselves with the fluid discharged by the decaying body, before making up their mind to separate from it. Widows during this time knit a garment of network covering their whole body. They put it on when the dead husband is definitely buried, and wear it till it falls in shreds from their body, which has before been blackened with coal, and must not be washed during the entire period of mourning. Disgusting as these customs may appear to ourselves, they are the expression of an uncommon and deep sorrow in the bereaved, and by no means a mere outward show.

The Governor of British New Guinea, who takes a true fatherly interest in the aborigines, was at that time doing his utmost to suppress these mourning rites, to which he attributed the rapid spread of the epidemic raging at that time. In villages over which he possessed power and control he therefore gave orders to bury the dead immediately after their decease, and that, not as before below the houses, but outside the villages.

This order, which forced the aborigines to break with ancient and hallowed traditions, met with the most violent opposition in the whole of the St. Joseph's district. At first it was simply left unheeded. When, however, the Governor threatened to severely punish any village that should continue to mourn and bury its dead in the old fashion, there arose a violent resistance. The principal sufferers in this matter were the poor missionaries, to whom the natives attributed all the trouble, and on whom they were better able to vent their wrath than on the distant Governor.

On the afternoon of that day a group of men splendidly armed and decorated drew up before the mission-house. A warrior of gloomy aspect, wearing several pounds of shell ornament, in the shape of necklaces and bracelets, of earrings and brooches, was the speaker. The snowy-white of the decorations contrasted brilliantly with the brown and velvety skin of this glorious fellow. His nose was perforated, and through it he had stuck a finely-pointed skewer, about a foot in length, made of the marble-like tridacna shell, which had been cut and elegantly polished for this purpose. The natural splendour of his perruque had been further enhanced by a sort of diadem made out of the feathers of a bird-of-Paradise. To

give his toilet the finishing touch he had donned an uncommonly tight belt of straw. Never had I seen a man got up in such grand style. There he stood amid the circle of his companions, tormenting good Father Hubert with incessant parleyings, which could only lead to nothing, as the missionary had not the power of reversing an order of the Governor.

I have not heard how far the latter has succeeded in carrying his point and in abolishing the traditional mourning customs, but the influence of the British Government is not yet strong enough to enforce severe measures of this kind, save in very few of the Papuan villages.

Much less morose and sullen than the men were the little folk of Mou and the two neighbouring villages. They hung on to me like burs whenever I set out to catch animals and butterflies in the shrubs and plantations, chattering, laughing, and singing at the top of their voices, and helping me to get many a fine specimen, whereby these boisterous little friends turned out quite useful assistants. Among all the non-European races, with whom I have come in contact, be they Negroes, Malays, Mongols, Tamils, Australians, Polynesians, or Papuans, the latter seem to me in many respects by far the most attractive. They are decidedly of an artistic temperament, light-hearted, merry, excitable, given up to and ruled by the impressions of the moment, true children of their brilliant country, the animal productions of which—birds of paradise, parrots and kingfishers, beetles and butterflies, other insects and spiders—show greater richness and brilliancy in colour and design than those of any other region on earth.

The disposition of the Papuans is light and gay. Solemn and grave as is the mien and deportment of the old gentlemen, the laughing youth forms the domineering element in every village. The Papuan is of a decidedly domestic turn, and has much taste for the joys of family life. Man and wife—though most of the men boast several spouses—are generally very fond of each other, the women especially being much attached to their husbands, by whom they are in general kindly treated. Their duties consist of domestic work, in taking care of the plantations, and, where the proper clay is to be found, in the manufacture of earthenware. The men, meanwhile, go a-hunting, or a-fishing, or venture abroad intent on tribal wars or commercial voyaging. If nothing particular is going on, they busy themselves with their artistic pastimes—decorating their houses, their tools and weapons, woodcarving, cutting, and painting.

The children grow up in full freedom and without restraint, drilling, or bullying of any kind. They thus form a happy assemblage, amiable and sympathetic if somewhat boisterous, and, though far from respectful, so pleasing in their boldness and freedom from constraint that it is impossible to be angry with them.

Father Hubert told me that it is the chief desire of the missionaries to awaken the religious sense in the children, which is done by relating to them Bible stories, teaching them reading and writing, and by letting them sing hymns to simple melodies. Passionately fond of music as they are, the children are very much attracted by their singing lesson, which is the principal magnet drawing them to school, attendance at which must, of course, be entirely voluntary. The instruction is given in the native language, which is here the Maiva dialect. Some illustrated song and hymn-books in this language have been printed by the missionaries themselves by handpresses. The chief influence on the education of the little ones is exercised by the mission Sisters residing in some of the villages. They seem to know far better than the men how to deal with the child-mind. Admirable, indeed, is the unselfishness and charity which prompts a European woman to spend her life in a Papuan village, untiringly at work on the difficult task of tending to and cultivating these wild little plants.

Father Hubert told me that he and his collaborators had almost given up the christening of adults, and that they make a point of christening only those who show at least a gleam of comprehension of the Christian faith. I very much liked talking to this man, who had clear and unprejudiced views on the matters and the people he had to deal with. But on my asking him whether the Catholic missionaries had divided their sphere of work with the Protestants, so as to reserve for themselves the St. Joseph's district, while they yielded the parts west and east of it to the latter, he laughed in my face, declaring that such a thing could not be dreamed of. He and his companions were working for the present in this place because told to do so by their superiors. As to the Protestant missionaries, their work did not concern them in any way. They could not look at it as a real work of salvation, since that which the Protestant brought to the natives was powerless to rescue the lost souls from purgatory. So the Catholics hold themselves bound to propagate the "Only True Faith" everywhere, as their time and circumstances may permit.

In the evening a Brother from Babiko on the St. Joseph's River arrived at Mou, saying that he thought it impossible at present for us to go up the river either by canoe or on foot. Such heavy rains

had fallen near Mount Yule during the previous weeks as absolutely to prevent travelling on the stream and its tributaries, and to make a land journey with luggage and bearers inadvisable. He himself had had to wade through nine little rivers on his short journey to Mou, with the water rising up to his shoulders; and had twice been forced to swim. On the next morning I accompanied Father Hubert to the river side, following narrow paths trodden by the natives in the high grass. We found the country rendered wholly impassable by the flood and the devastating power of the torrents, so that I thought it best at once to give up my plan of going up the St. Joseph's River. Though not exactly impossible, the journey would have cost me much time and trouble, and, as we did not seek any special object in these parts, I thought it more expedient to set out for my inland expedition to places where normal conditions reigned, and in this resolution I was mindful of my unlucky reminiscences of the Auburn and Burnett floods, which had proved so detrimental to my Queensland work.

On returning to the village we met a group of young men who were just returning from a successful kangaroo hunt. They had killed two strong males of the wallaby, *Macropus agilis*, which occurs both in New Guinea and the northern parts of Australia. Besides this New Guinea possesses but one kind of *Macropus*, *M. Brownii*, which is limited to this country and to New Britannia. A species closely related to it, however, occurs on the Aru and Kei Islands. Next to these two large wallabies, the booty of this hunting-party consisted of five or six specimens of a smaller marsupial, strongly resembling a wallaby, *Dorcopsis luctuosa*. The genus *Dorcopsis* is restricted to New Guinea, and may be distinguished from the true *Macropodidae* by its relatively short hind and long fore-legs.

As for hunting, the Papuans can in no way compete with the Australians. They neither know the track of the game as well as the latter, nor are they such experts in stalking or in the handling of weapons. The latter consist in these regions of spears, bows, arrows, and clubs. East of Port Moresby bow and arrow disappear, the spear and club remaining the only weapons, be it for war or hunting. The Papuan dogs very much resemble the dingo of the Australian, but their training for the hunt is nothing like so good, and it is certain that they are more frequently used for food than for sport. Dogs' meat is considered a great delicacy by the aborigines, and seems, together with pork, indispensable at any of their festivities. The dogs are chiefly fed on vegetable substances, and their flesh is

said to possess a tolerably agreeable taste. Dogs' teeth are a favourite ornament, and are generally strung up like beads as a necklace, or used for the trimming of plaited articles.

The mode of hunting kangaroos and *Dorcopsis* is everywhere the same. They are driven into long nets, and speared or clubbed before they can extricate themselves from the meshes of the network. Kangaroo meat is, however, considered inferior to pork or dogs' meat.

Early the next morning we left Mou by whale-boat, and returned to Pinupaka by ten o'clock. On passing the bar of Poino Creek, our boat was in great danger of capsizing, some very heavy seas washing overboard. Towards noon we were in Roro, and bidding hearty farewell to our kind and hospitable missionaries, we weighed our anchor. Till sunset we flew swiftly along, propitious winds carrying us past Suckling Cape. Then, however, a calm set in, and as a strong current took hold of our boat and drove it back, we had to give up struggling against such untoward circumstances, and to put into Redscar Bay off Manumanu. During the night we were once more overtaken by a terrible thunderstorm, the rain forcing us to retreat into our bug-infected cabin, where it pursued us through some chinks of the deck. Altogether this was the usual course of events during the first month of our stay in New Guinea. The day began with a fine morning, a blue sky and a clear atmosphere making the outlines of the distant gigantic mountains appear charmingly sharp and distinct. Towards ten or twelve a mist used to rise, and the mountains began to veil themselves till nothing but a heavy mass of clouds marked the place where they had appeared in the morning. During the night we nearly always had prolonged thunderstorms sending down torrents of rain, the power of which can hardly be imagined by one who has never been in the tropics. At the same time the winds worried us very much by their irregularity, this being the period of the change between the north-west and south-east trade-wind. It was impossible to rely either on the sea-breeze, usually blowing in tropical countries from 10 A.M. till towards sunset, or on the land-breeze expected during the night. Sometimes we remarked these periodical local winds, sometimes, however, they were quite effaced by the struggle between the two monsoons, which brought us strong south-east and north-west storms, followed by absolute calms. The only phenomenon which was tolerably regular was the abating of the wind towards sunset.

The next morning at eight we passed Redscar Head, and cast

anchor at 1 P.M. in the splendidly sheltered harbour of Port Moresby, the navigation of which, however, is not quite easy on account of its numerous little reefs and coral banks. Port Moresby is by far the most notable European settlement in British New Guinea, and the light and pretty houses strewn among the hills do much to enliven the picturesque and pleasant scenery. But a small number of whites live there, I believe not more than twenty, so that Port Moresby ought rather to be designated a central station of the Government and headquarters of the London Missionary Society than an independent settlement. The work of the latter society began in 1871 under the Revs. A. W. Murray and S. M'Farlane, and was continued by the Revs. W. G. Lawes and J. Chalmers. The services they render to humanity are those of true philanthropists and indefatigable investigators, and these noble men are now seconded by a number of younger assistants.

In November 1884 the Commodore Captain J. E. Erskine proclaimed the British Protectorate over south-east New Guinea, Germany having a short time before hoisted her flag in the north-east, taking it and the Bismarck Archipelago under her protectorate. Already, in March 1883, Mr. H. M. Chester, Police Magistrate of Thursday Island, had proclaimed the British Protectorate over the whole of East New Guinea eastward of the 141° meridian of east longitude. This act of taking possession, in which he was not authorised, was not, however, sanctioned by the British Government, and thus it happened that the precious colony now forming German New Guinea was within a hair's-breadth of being lost to the Fatherland.

At first Major-General Sir Peter Scratchley, and then the Hon. John Douglas, now Governor Resident of Thursday Island, were Administrators at New Guinea, with Port Moresby as residence. In September 1888 they were succeeded by the present Administrator, Doctor (now Sir William) Macgregor, who immediately after his arrival proclaimed actual rule instead of mere protectorate, thus turning British New Guinea into a British Crown Colony. The governing and administration is not, however, exercised directly from England, but through mediation of the Queensland Government.

The rule of the north-east quarter of New Guinea by Germany at first created the most lively excitement and indignation throughout Queensland. The whole of this island, so closely adjoining the north of the colony, had been secretly regarded as a natural possession, so

that the idea of another power suddenly snapping away one half of the morsel seemed at first quite incredible. Persons versed in these matters assured me that had Queensland at that time boasted a small fleet and something like an army, it would have declared war against Germany on its own account. Now minds are at peace once more, and the people laugh at the past, and regard the Germans as unobjectionable, if at first unwelcome neighbours.

I have already said that everything in New Guinea appears to me interesting—country, plants, animals, and man. A worthy governor of this attractive country is its present administrator, and his system of leading the colonisation of the virgin regions entrusted to his care, seems to me most admirable.

Sir William Macgregor, born in Scotland in 1846, intended to follow a medical career, and pursued his studies in the Scotch schools, later on at Berlin and Paris. Then he spent some time as a physician at the Seychelles, and a yet longer time at Fiji. There his administrative talents began to appear most brilliantly. His merits in subduing the riots of Viti Levu were rewarded by an annuity of £200, and later on he was appointed substitute for the Governor of Fiji, and in 1888 Administrator of British New Guinea.

I unfortunately missed the opportunity of making Sir William Macgregor's personal acquaintance, as during my stay at New Guinea he was absent on a visit to Australia. It is a true saying, however, that one can judge a person from his deeds, and I may say that these, as well as the spirit which marks all the Administrator's doings, and the conception he has of his own position and duties have excited my highest admiration. The situation occupied by him offers him three principal tasks: the care of the aborigines as the original holders of the land; the scientific and subsequently the economic unfolding of the country; and finally, the control over the European and Australian settlers. Supposing the colony belonged to a country like Germany, poor in colonial possessions, its economic development would naturally form the principal duty of the Governor. Taking into account, however, the extent of England's colonial possessions, and considering what enormous stretches of country are, even in Australia, waiting to be cultivated and turned to advantage, one will easily understand why Sir William Macgregor sees his duty from a somewhat different point of view. Together with the scientific investigation of the country, it is the care for its interesting and sympathetic inhabitants which lies at his heart, and is far more important to him than the immediate colonisation and appropriation of the soil by Europeans.

Eminent are his achievements as a geographical pioneer. In 1889 he ascended the principal summits of Mount Owen Stanley, unto its highest point Mount Victoria. This is the greatest feat which has been accomplished in the geographical investigation of New Guinea, next to the explorations of the Italian naturalist, d'Albertis, who, in the years of 1875-77, undertook three expeditions up the Fly River and deep into the inaccessible regions of the interior. In the very same year in which he had mounted those peaks, Macgregor also went up the Fly River, penetrating still farther than d'Albertis, till at last he entered upon German ground. From all these journeys he brought home extensive zoological, botanical, and geographical collections, and a minute knowledge of the customs and language of the natives he had met. But never did the former physician allow the scientific interests to preponderate more than was their due. Thus, as I have already mentioned, he once threatened to turn out a naturalist on hearing that he intended to collect hundreds of Papuan skulls, being afraid lest this might tempt the simple savages to collect the desired material by some hunting expedition fatal to their brethren. On his journeys of exploration the Governor tries as far as he can, to avoid violence. Murders, be they of white or black persons, are, of course, punished as far as lies in the power of the Government. Rather, however, will he leave a murder unrevenged, if it happen that the culprit cannot be discovered, than allow whole villages or tribes to be made responsible for the wrong-doings of one individual. Besides this, all interference with the habits and customs of the aborigines, when not indispensable from a hygienic point of view, is abstained from, and only the work of the missionaries, which may be described as most beneficent throughout the whole of British New Guinea, is upheld and assisted as much as possible.

Merchants, settlers, and gold-diggers are kept under good control, and the Administrator is ever ready to defend the interests of the aborigines against their encroachments. Not a piece of soil is allowed to be purchased without the permission of the Governor, who makes sure in every case that the native shall see clearly into all sides of the matter lest he inadvertently sacrifice a valuable possession for a mess of pottage, or perhaps for some pieces of tobacco and a few axes. Though it is allowable to engage blacks as labourers, one is not permitted to take the engaged hands to distant districts, where they are helplessly left to the not always tender mercies of their employers, and it is absolutely forbidden to take the aborigines of New Guinea to Australia to work in the sugar plantations of that

country. This wise prohibition gives the New Guinea natives an advantage over the South Sea Islanders. Further, it is not allowable to sell firearms to the natives, and even the Chinese and Manila-men—in short, all the foreign coloured men living on New Guinea—have to get a special Government license for carrying arms. This license is given them for a limited time, and may be withdrawn at any moment. Just as severe is the prohibition to sell liquor to the natives, and owing to this salutary law it has been possible to keep them untainted by alcohol. Thus brandy, which in Africa plays such a prominent part as an object of barter, is, as such, quite unknown on the New Guinea coast.

It is owing to these restrictions and impediments that the commerce among the whites of New Guinea is as yet not worth mentioning. A small number of white merchants roam about the coasts in their own little sailing boats, exchanging tobacco, beads, knives, and axes, for some products of the country, principally copra, tripang, and tortoise-shell. As yet one hardly sees European plantations or establishments on a larger scale. Many Queenslanders are discontented with this state of things. They want the total opening of the country, with a view to treating the New Guinea aborigines as they are wont to treat the natives of Australia. As for myself, I think Macgregor's system of protecting the Papuans against all abuses most admirable, and in it he is in perfect agreement with the Queensland Government. I even go so far as to believe that this mode of procedure will, in time, bear better interest from a purely mercenary point of view. For a set of aborigines who have been charitably treated and carefully accustomed to civilisation, are sure to become a better and economically more productive nation than a people cheated of their soil by foul tricks, deprived by alcohol, and blighted in their courage and self-respect by a system of blind punishments. How often, however, has this been the way of civilisation, regarded as the right, yes, even as the righteous one, by the gentle and cultured European!

On the occasion of my visit the Governor was absent from Port Moresby, and I was welcomed by the Hon. T. H. Hatton Richards, who, like all the Australian officials I met on my journey, was most amiable and obliging. The settlement of the whites consists of a small number of houses and sheds, dispersed all along the shore and among the small hills bordering the coast. These hills are fairly steep, and grown with but a scanty vegetation, so that they offer a bare and barren aspect. Indeed this area is less favoured by nature than most of the rich and fertile south-east coast. Beginning on

the projecting peninsula situated on the east entrance of the harbour, the settlement is scattered pretty far to the north along the coast. It possesses only one store, belonging to the enterprising Queensland firm, Burns, Philp, and Co. Here I completed my travelling outfit by purchasing some bartering articles, which proved very useful in the course of my journey. The Government building occupies a dominating position on top of a hill, about 130 feet above the sea. To our regret it was locked up on account of the Administrator's absence, so that we were not able to inspect the handsome collection of finely-cut Papuan stone clubs, for which he has an especial liking.

The aborigines of these parts are most expert in the manufacture of elaborate stone clubs, one of which—and by no means an exceptionally handsome one—I have depicted on p. 397. Only the head of the axe consists of stone, its axis being perforated by a smoothly-polished round hole, into which a handle of strong and heavy wood is introduced. It is astonishing to note how the Papuans manage to perforate the hard stone without iron tools, and how they succeed in modelling its surface so elaborately.

In the neighbourhood of the Government buildings we saw a large number of prisoners in chains working on the road. These men were Papuans condemned to from three to ten years of penal servitude. They suffered for deeds—mostly murders—which, often enough, they had committed for the sake of ancient traditions, and coerced by hallowed institutions. The power of the Government to restrain and to control the savage customs of the aborigines is as yet limited to some coast districts and to small portions of the inner land. Most of the natives do exactly as their fathers did before them.

Mr. Hatton Richards invited us to dinner and introduced us to the Italian naturalist, Mr. Loria, who had been staying at New Guinea some time, and was just preparing for a longer expedition into the interior. The Italian naturalists and collectors seem to have a partiality to New Guinea as a field for investigation. Here it was that d'Albertis and Beccari earned their laurels, and now Loria followed in their footsteps. The whole coast, as far as the East Cape, was well known to him, and he advised me to visit Hula, Aroma, Suau, and Milne Bay, these places being particularly interesting and suited for researches of every kind. I followed his advice, and have every reason to be grateful for it.

After dinner we made the acquaintance of the missionary, Mr. Dauncy, the invitation to whom had been transmitted by Mr. Hatton

Richards by flag-signal, which could be seen from Mr. Dauncy's residence at the other side of the bay. For many years together Mr. Lawes and his wife had been at the head of the mission at Port Moresby, where they exercised a most beneficent influence. Just now he was occupied on a lecturing tour through Australia, on which I had the pleasure of meeting him during my stay at Rockhampton (as I have already had occasion to mention). His locum-tenens, Mr. Dauncy, invited us to accompany him in

Port Moresby.

In the background the Mission Station ; in the foreground the pile-villages of the natives.

his whale-boat to the mission-house to spend the night there. The mission buildings are situated still farther to the north-west, at some distance from the settlement of the whites, on the top of a hill just above the native villages. They consist of half a dozen buildings, the church, and the lodgings of the white missionary, the coloured teachers, and the mission pupils. The London Missionary Society has a peculiar method of pursuing its aims. Besides the white missionaries, it educates a number of South Sea Islanders, who are taught and prepared for their calling on particular mission schools of the South Sea, as, for instance, on Tahiti, Rarotonga, and Samoa. These coloured missionaries, called teachers, work under the superintendence of their white superiors. Their habits being

kind than if one were limited to white-skinned propagators of the Faith. It is true that they do not exercise the same authority over the aborigines as the white man ; but this is partly counter-balanced by the circumstance of their being better able to enter into the ideas of the primitive races, and of their skill in adapting religious topics to the primitive mind of the native. Their religious zeal and their devotion to their calling is equal to that of any white missionary, so that, especially in these regions, where their work is submitted to an incessant control, it may be regarded as very beneficent and successful.

My journeys in West Africa had inspired me with a strong prejudice against coloured missionaries, which proved totally unjustified in New Guinea, chiefly, I believe, as the result of the good and continued superintendence exercised over the coloured missionaries by their white superiors. For some time it has been the custom to educate New Guinea natives from their childhood in the Port Moresby mission school, in order to fit them for teaching their own people ; and the plan appears to have been tolerably successful, though, as regards intellect and character, the leaders of the mission could not give them as good a testimony as that awarded to the Polynesians. The average Samoa or Tahiti "teacher" is declared superior to the cleverest of the Papuan teachers, the Samoan being, so far as I could gather, the most gifted of all. The coloured teacher of Port Moresby, Ruatoka, was said to possess unusual intelligence and capacity, and had been of eminent use to the mission in the long course of his service.

On the shore below the mission we saw the native villages, Tanobada and the somewhat larger Hanuabada, and on a little island opposite Elevara. Here I made the acquaintance of the celebrated Papuan pile-buildings, which show us how the prehistoric Swiss pile-villages must have looked, and give us an idea of the time when our ancestors, ignorant of the use of metals, manufactured their primitive tools out of stone, bones, and wood. It is, however, only the oldest Swiss pile-buildings that belong to the Stone Age. In the more recent ones we find that copper and bronze were in use, and here and there even symptoms of the Iron Period may be observed.

This is more than our Papuan friends have as yet arrived at. They are altogether children of the Stone Age. Most of the houses stand on strong and generally crooked mangrove trunks,

surrounded by water during flood-tide, whilst at low water the ground on which they are built lies partly or totally dry. It is natural that these villages can only be erected in places perfectly sheltered from the breakers, therefore they are principally found in bays or under shelter of a reef, or of shoals adjoining the coast. The expediency of the system appears evident. The Papuan tribes live in continual warfare with each other, and the people of the coast are in great fear of the attacks of the inland mountain tribes, whom, from some inexplicable reason, they consider as prodigiously savage. If an attack takes place, the inhabitants of the pile-village are able to jump into their canoes, which are close at hand, ere the attacking force have found time to make their passage from the coast to the village, thus evading their pursuers by a flight into the open sea. As for the villages of Port Moresby, the advantage of the plan seems impaired by the circumstance that the desired protection is rendered futile during ebb-tide, and I am sure that the wisdom of even a Papuan chief-commander will lead him to defer his attack till low water. Moreover, the inhabitants of the villages in the vicinity of Port Moresby are known as valiant warriors, and it is perhaps owing to ancient tradition rather than to the fear of their enemies that they build their houses on piles and into the sea, never giving a thought to the original reason of this system. Other villages, which I saw later on, are pushed farther out into the sea, on ground which remains submerged even at low water.

Many of the villages situated farther inland are protected in a different way from sudden attack, thus, for instance, Laroki, near Port Moresby, and numerous places of Milne Bay. In each of these villages we find, besides the usual houses standing on piles stuck into the ground, others which are hidden like nests amid the branches of high trees, 20, 30, or more feet above the ground. As soon as an attack threatens, the inhabitants fly into these tree-fortresses. Here they find stones and spears ready for use, so that they can easily defend themselves against any force, and particularly against the felling of the mighty trees, in the foliage of which they have found shelter.

The Port Moresby population consists of about 1000 heads belonging to two quite different tribes, the Koitapuans and the Motu. The former are the real owners of the land and cultivators of the ground, and they live on the produce of their plantations and by hunting wallabies. They are also considered great sorcerers and rain-makers, and are therefore feared by the other

tribes to a ridiculous degree. The Motu are fishermen and sailors. They settled here later than the Koitapuans and with their especial permission, exchanging the yield of their fishing expeditions and the earthenware manufactured by their womenfolk for the fruit and the hunting booty of the Koitapuans. It is they who undertake those bold commercial expeditions to the Gulf of Papua, of which I have already spoken. Although superior to the Koitapuans in number, they do not consider themselves as conquerors but as guests. Wonderful it is, that, though this peaceful union has so long existed, both tribes have preserved their own peculiar and strongly differing dialects. Fights between the two tribes do not seem to occur, though it is said that the relations between the inhabitants of the three villages are rather uncomfortable, on account of incessant quarrelling among them, a circumstance which does not lessen the task of the missionaries. The inhabitants of the island Elevara are said to be a particularly quarrelsome set.

Mr. Dauncy showed us everything worth seeing, and led us through the three villages and the mission buildings. In the evening the mission pupils sang a number of hymns translated into the Motu language by the white missionaries, and set to the melody of English sacred and popular songs. I was particularly charmed with one of those hymns, which was sung to the beautiful melody of "Home, sweet home." The cultivation of music by the missionaries has always excited my special admiration. Even where there is but one coloured teacher, whose success in all other matters may be slight enough, the children occupied in the neighbourhood, and a great many other bright boys and girls, will assemble towards evening in his house, where they settle on the floor, beginning with great glee and with a fine musical instinct to sing the simple hymns, the words of which will not fail in time to impart themselves to their souls and to exercise a soothing influence on their little minds. From the verandah of the mission-house we enjoyed a charming view of the villages just before us, of the harbour, and the bungalows of the whites opposite. How pleasant it was to chat and to smoke our pipes, inhaling the delicious freshness of the splendid tropical night, listening all the while to many an interesting observation and curious adventure from the lips of our kind host.

Next morning we assisted at a short service in the handsome church of the mission, built by Mr. Lawes himself, with the assistance of the aborigines. It is a fine building, more than 60 feet long and

25 feet broad, resting on mangrove piles. The floor is constructed of the boards of old canoes, which are so tightly joined as to resemble an elegant French floor. The framework of the house and its ceiling are made of stems felled and trimmed on the spot, the side walls and roof neatly and smoothly covered by pandanus leaves. Windows are wanting, but air and light is allowed to enter freely through the open doors. The service I was not able to follow, as it was celebrated in the Motu language, which, as I believe, is destined to become a sort of *lingua franca* for British New Guinea. It is a queer mixture of Papuan and East Polynesian elements, the words being derived from the Polynesian while the grammar bears a more Papuan character. It is owing to the sea-faring habits of the Motu that their language is already understood in many places of the coast, so that its further propagation only depends on the Government and the missionaries. The congregation listening to this morning service was, as must be owned, very small indeed, consisting, besides the mission pupils, of about half a dozen villagers. One of the latter, an ill-humoured and sinister-looking old man, stood forth delivering a sort of prayer or confession, and we afterwards heard he was a celebrated warrior and war-chief of the Motu, a dangerous fellow, bold and rapacious, and by no means an old friend of the mission. Some years ago, however, this Saul had, apparently, turned into a Paul. Now he was one of the most zealous church-goers, and promised to become the very pink of piety. A melodious hymn, sung with great zeal, closed the little service.

Towards 10 o'clock we weighed anchor, but found it difficult to get along on account of a calm, which was broken here and there by sudden and transitory squalls from the west. We passed Tupuselei, a large and fine coast-village, but were obliged to anchor off Kapa-Kapa towards sunset, because the wind had by that time totally died away. Next morning we passed Round Head. It took us, however, another day to get to Hula as we had a strong south-east wind against us, which forced us to fight our way in a very tiresome fashion by continual tacking.

Hula is situated on a projecting point of Beagle Bay. To the west of this cape the coast forms a second bay, Hood Bay, in the curve of which is situated the village Kalo. In its vicinity the Kemp Welsh River, a considerable stream, enters the sea, after having passed through a most fertile and populated mountain district. The village Kalo is of fatal renown on the New Guinea coast, as four Polynesian missionaries, with their wives and children,

Papuan pile-village. In the background a laktof under sail.

in all twelve persons, had been murdered there eleven years before my visit. They were sitting in their whale-boat, when they were suddenly surrounded by natives and cruelly speared by these brutes, who, as they thought, had come to welcome them. One of the spears passed through the body of a mother and the child she held in her lap. The corpses were thrown into the water as food for the crocodiles. It has never been proved what may have driven the natives to this treacherous and apparently causeless deed. Certain it is that it was not brought about by any fault of the missionaries themselves, as no accusations whatever were raised by the murderers against the victims. Perhaps it was only the lust for blood, or even a mere momentary impulse, which excited their passion. The principal instigator of this terrible deed, Quaibo, the chief of Kalo, was killed soon after, together with three of his men, by an expedition sent on land from the man-of-war, *Wolverene*, to avenge the murder. The death of this main culprit, after a most violent resistance on his part, was considered a sufficient expiation, and a total burning down of the village or massacre of a herd of innocent human beings (slight punishments which are habitual in some other colonies) was not enforced.

One may well talk of "chiefs," when speaking of the Papuans, since we find in many villages men of considerable renown who play a leading part and exercise great influence. Still, the power they possess is due rather to the people's voluntary submission to their frequently-tested cleverness and experience than to any official or lawful claim to this prominent position. Thus in many villages we find, instead of one acknowledged chief, a number of prominent and leading personages. A valiant spirit, cleverness and experience, and with all this, a supposed gift of sorcery,—these are the qualities which give one Papuan an influence over his fellows; hereditary power, however, we find nowhere. In many respects these customs reminded me of the already-described Australian institutions, but a conspicuous difference consists in the fact that the Papuan communities are based on a much less communist pattern than those of Australia. The landed property, the plantations and houses, not to speak of ornaments and weapons, are private possessions. Shells are not used for money in this part of the coast, and property consists merely in land, plantations, and tools, which its owners are not particularly bent on augmenting. Therefore we do not find a difference between rich and poor; every one has enough to live upon, and no one is economically dependent on another. Thus social life in these parts of New Guinea, though not of a communist, is

still of a strongly democratic character. It is very rare that a chief attains real power and far-spreading influence, as, for instance, the celebrated Koapena of Aroma, whose acquaintance I made soon after.

This want of officially-acknowledged leaders in the villages has many disadvantages for the English Government. It is very difficult to find any individual who might serve as an intermediary, or be qualified to bear any real responsibility. So the Government has tried to "make" chiefs, following the celebrated example of the "king-maker," the Earl of Warwick. It has, in villages hitherto lacking a leader, chosen men that seemed worthy of this position, and invested them with a staff, marked with insignia which denote their dignity as chiefs. These staffs, however, fell short of procuring them any real influence, and the Hula dignitary, who often accosted me in hopes of tobacco, possessed less authority than many other men, in spite of his decoration.

To any one who approaches Hula from the sea, the numerous pile-buildings scattered about over the water in a circuit of several miles, will offer a very quaint aspect. As a superficial estimate, the village might contain about a thousand inhabitants.

At Hula dwells a Polynesian missionary, Itama of Rarotonga, who immediately came on board our boat, inviting Mr. Douglas and me to spend the days we intended for our visit to Hula at his own house. The one-storied edifice, built after the European system, but, like all the mission-houses, of indigenous materials, was situated close to the shore, several miles distant from our anchoring-place. The tiny dinghy which we had on board our lugger was much too small to hold us and our luggage and provisions, as well as the apparatus we wanted for collecting. So we entered a big canoe rowed by four aborigines, which brought us safely, if not dry, across the breakers to the place of our destination. The canoes in these parts are dug-outs of solid construction, and furnished on one side with a long outrigger covered by a platform of bamboo, on which it is better to sit than in the narrow canoe itself. It must, however, be owned that sitting with one's legs stretched straight before one, if continued for long, is rather trying to a European. Though it rarely happens that a canoe capsizes amid the breakers, the waves often dash over the platform and enter the narrow hollow of the boat, the only depository for luggage. Little as I minded getting drenched myself, I was anxious about my camera and plates, which I could not protect from an occasional sprinkling, with the result that numerous pictures of the beautiful

scenery and the interesting children of this wonderful country got spoilt.

In Itama's house I found an English trader, John Swords, who travelled alone along the coast, bartering the usual articles—axes, knives, glass-beads, and tobacco, against the aborigines' copra, resin of copal, tripang, and mother-of-pearl. He was not even possessed of a boat like most of these traders, six or eight of whom lead a bartering traffic along the coast of British New Guinea. The existence of these traders is beset by privations and dangers, and the wares they convey tempt the avarice of the aborigines, to which more than one of them has fallen a victim. Swords, a simple and, to all appearance, quite honest fellow, was suffering from fever, and unluckily considered brandy and whisky the best remedy against this tenacious disease—an opinion fatal in more than one respect. For it is natural that a white man given to drinking is no very dignified representative of his race, and little suited to enhance the respect entertained by the "savage" for the stranger and his civilisation. It seems, however, that this vice is of frequent occurrence among the pioneer settlers and traders of British nationality; while the German, in his predilection for the less-intoxicating beer, possesses a sort of charm against heavier forms of alcoholism. The greater the pity then that beer in the tropics possesses a decidedly pernicious influence on stomach and liver, so that, when plentifully taken, it does yet more harm to the health than stronger liquors.

The first aborigines we saw consisted principally of women and children, most of the men being absent on a great fishing expedition. The inhabitants of the part of the coast between here and Aroma are conspicuous for their tall and strong well-built bodies, thereby differing strongly from their eastern and western neighbours. I remarked some girls of splendid figure and bearing, and whose faces were pretty, even from our European point of view. Many of the children had hair one might have called chestnut-coloured; it was of a half-wavy half-curly quality. The hair seems to get darker with age, but hardly ever attains the real raven-black colour. The bodies are of a dark-brown hue, not as light as that of the Roro people, nor as dark as that of the Motu-Motus. Some of the aborigines, particularly the women, had their forehead, nose, breast, back, and arms—rarely their legs—tattooed in patterns consisting of big strokes and dots, forming pretty and diverse designs. Their ears are decorated by elegantly cut pieces of tortoise-shell, joined in a cluster and attached to the horribly distended ear-holes, and frequently I saw the girls stick a flower into their ear, or into

the bracelet adorning their arm, whereas the neck is often decorated by a sickle-shaped piece of mother-of-pearl, as represented on the adjoining page.

The children and maidens of this place were very friendly and confidential, continually bringing me lizards, butterflies, and other insects. All day long a party of them were to be found on the verandah of our house, ready to accompany us on our walks and rambles.

The boys go naked till they are grown up. On the setting in of puberty they tie up, but do not conceal, their pudenda ; whilst the girls from their fifth or sixth year wear a petticoat of grass or coconut fibre, leaving the rest of their body uncovered, as is the custom all over New Guinea. To be photographed was a grand joke for all of them, and I had much trouble in isolating a single individual, so as not to get thirty or forty persons into my picture instead of the one I wanted to immortalise. The preceding photograph is the picture of such an assembly, though the abundance of black bodies represents but a limited section of the juvenile crowd surrounding me. Wishing to portray one young girl of uncommonly good looks, I separated her from the rest, gave her a favourable position, fixed my camera and adjusted the lens, surrounded all the while by a crowd of people behind and beside me, the children cheering, the women most ardently attentive, the men benevolently smiling. Evidently my subject was proud of the distinction she enjoyed and the attention vouchsafed to her. Quite suddenly, however, this simple savage, untaught as she was and innocent of the laws of reticence and prudishness, became convulsed by shame, covered her eyes with her hands, and valiantly resisted every attempt to make her stand forward as before. At the same time I noticed that the hue of her features changed, the brown of her face becoming darker and deeper than before, a phenomenon easily explained by the fact of the blood rising into her head. Had she not been a brown girl one would have said that she blushed. At all events, the physiological process was the same as that which forces us to blush, and it was most interesting to see that the feeling of shame is manifested in the same way in those coloured savages as in the white face of the European—by a rush of the blood into the skin of the face, and a subsequent covering of the latter with the hands.

The girls of Hula cannot be said to possess great timidity or reticence ; they evinced excessive friendliness towards us, and seemed much astonished that we did not manifest any wish to enter the holy state of matrimony then and there. Swords, who had lived long

in these parts, intimated to us that the morals thereabouts are rather slack, and his testimony was corroborated by the absence of mareas, or sleeping-houses for bachelors, common on the more western parts of the coast, which are the best proofs of a severer moral training.

Amongst the little girls between six and eight years of age we found two perfectly charming creatures, whom a black Raphael might have easily turned into a pair of Papuan angels. They were the particular pets of Douglas, who attempted to take their likeness several times. This, however, was not so easily done, the little ones being much too shy to face the camera without their friends. Itama at last succeeded in persuading them by help of the elder girls, when, just as the children took up their positions previous to being photographed, their mothers, who had come up during the long preamble, protested most energetically. They forbade us to take the children's likeness that day, but promised to present them to us on the morrow. On the next day the riddle was solved. Both the little angels were solemnly brought to meet us nearly smothered in ornaments, their hair decorated with feathers and combs, their ears with tortoise-shell pieces, their little throats surrounded by plates of mother-of-pearl and chains of dingo-teeth, legs and arms hung with rings and shells, teeth, and all sorts of network. In short, two living Papuan museums. It seemed as if, since yesterday, the whole family treasures had been scraped together and heaped on the two innocent little bodies. Here, again, one may see that mothers are made of the same stuff all over the world, Papuan mammas being equal to any of our peasant women or fine ladies in the point of vanity as far as concerns their children.

For my zoological researches Hula was not very favourable, as there was no forest in the vicinity. Of the insects, reptiles, and amphibians living in the plantations, I had soon procured myself enough specimens, both through my own researches and by way of offerings from the aborigines. Hula possesses beautiful groves of coconut, and extensive plantations of taro yams and bananas; the latter, however, of no particular flavour, and only suited for cooking. Farther to the east they cultivate better kinds of this fruit, and the Milne Bay bananas are distinguished by unusual flavour and aroma.

These plantations abound in particularly large and handsome butterflies, among them one species of surpassing beauty. When it flits around the trees, glancing in the sunlight, it resembles a jewel lifted into the air by witchcraft. The males of this

butterfly, *Ornithoptera pegasus*, measure, with their wings extended, 6-7 inches, thus exceeding the largest European forms. Their colour is a splendid emerald green, their front wings adorned by two broad bands of velvety black, which are divided lengthwise by a narrow green rib. The back wings show a more insignificant black design. The other side of all the wings is of a less vivid green, which changes here and there into yellow and orange hues, and is pleasantly interrupted by black stripes and spots. The body is black, with a green stripe along the back, the hind part of a lively yellow. Beautiful as this butterfly will appear in any collection, to see it floating through the air at its own sweet will, every movement showing its brilliant yet quiet hues in all the shades due to the changing light, affords an incomparably charming sight. Not very frequent even in its Papuan home, this splendid creature at that time flew about by hundreds in the Hula and Aroma plantations, enlivening the scene most wonderfully. Though the females are larger than the males, the latter have been so unchivalrous as to reserve all the beauty of form and colour for themselves. The upper side of the females is brown with a white design. I had no great difficulty in catching numerous specimens as they have the habit of flying, if rather high, still slowly and with a certain dignity. Probably they possess a disagreeable taste, which defends them from the pursuit of their enemies, the insectivorous birds, so that they may boldly unfold the whole brilliancy of their wings in the sunshine. This species spreads as far as the Moluccas, where it is represented by another variety, *Ornithoptera priamus*. This latter is still larger than *pegasus*. The principal difference between the two consists in the absence of the green rib dividing the black bands. I caught the variety *priamus* in several specimens at Ambon, where it reaches an unusual size, and another splendid butterfly I caught in the Hula plantations was the Papuan variety of *Ornithoptera Helena*.

Three days after our arrival at Hula, we saw all the population suddenly flocking to the shore. At the same time there appeared on the scene a number of canoes containing the men of the village, who had just returned from an expedition, the success of which they proclaimed from afar, by a sort of noisy singing, accompanied by drums. Their cruise had effected the capture of that excellent delicacy, the green turtle, *Chelone mydas*, twenty-six specimens of which they brought home with them, preparing a meal that evening which might have excited the envy of any European gourmand. The men of Hula are experts in net fishery,

which they practise on a large scale, using enormous nets of clever workmanship.

Amongst the returning Papuans there was one man called Gima, who had for a long time been in European service, and who possessed a tolerable knowledge of the English language—a circumstance rarely found on the coast of British New Guinea. According to the wishes of the white missionaries, the Polynesian teachers learn the language of the aborigines, in order that they may the better enter into their ideas and traditions, and become their real friends and advisers. For this reason the European missionaries themselves do not speak English but Papuan to their Polynesian collaborators, generally using the Motu language, which they themselves thoroughly master.

By this method the Papuans are saved from speaking that grotesque and mutilated English spoken by the natives of other British colonies. Equally wise it is of the missionaries to refrain from radically reforming the original dress of the aborigines, and from presenting them with garments which, in their surroundings and under their circumstances, would be as pernicious to the health as unpleasing to the eye. It has by now been universally proved, and is admitted by every person of colonial experience, that the careless introduction of European dress among primitive nations and people of low culture is a most dangerous experiment. The native will at once become vain of the one costume he has been able to purchase, and anxious not to be seen in anything but the "latest fashion." Proud of his new raiment, he keeps it on his body by night and by day, sleeps in it when it is drenched by rain, runs with it in and out of the sea at random, remaining at the same time ignorant of the beneficent qualities of soap and water. The missionaries of the London Missionary Society therefore limit their dress reforms to a piece of cloth, which they make the lads who work for the mission wear round the loins. The women, as has been mentioned, wear grass-frocks, thus making further interference unnecessary. Only the missionary pupils, who are being trained to become teachers themselves, and who enjoy a higher culture altogether, generally wear European dress.

The fact that the native Gima knew some English was the more agreeable to me, as it enabled me to communicate to him my desire of procuring myself some specimens of the Papuan Echidna. At present we know but two Papuan species of Echidna: *Proechidna Bruijnii*, which inhabits the north-west of the island; and *Echidna aculeata* var. *Lawesi*, till now found only near Port Moresby.

My method of communicating to the aborigines my wishes as to the animals I wanted them to procure me, was the following: I was always accompanied on my journeys by a number of illustrated zoological tables, containing good pictures of all the principal types of the animal kingdom. When I showed them to the aborigines, they generally recognised the beasts immediately, being enchanted to find their old friends in this new shape. They used to consult each other as to doubtful forms, as it often happened that my tables did not contain exactly the species which existed in their neighbourhood. By this method I mostly succeeded in getting acquainted with the aboriginal names of the desired objects, where-upon it was easy to explain to the people what it was that I wanted from them.

Gima acknowledged the existence of an *Echidna* species in the surroundings of Hula, telling me, however, that this animal was not usually hunted by the aborigines, as is the case with the Australian species so much prized by my Burnett blacks, but that it was only encountered sometimes on a chance nocturnal ramble, or found here and there by the dogs. He was very doubtful as to the possibility of catching such a creature within a certain limited time, declared himself ready, however, to set out by night with a party of his friends and the necessary dogs to make an attempt. For every single specimen brought to me I promised a prize of axes and knives of the value of 12s. The natives having hunted in vain for two whole nights, I felt convinced that with this method the catching of an *Echidna* would be a mere thing of chance, and therefore thought it better not to waste time waiting.

Early in the morning of 20th April we went under sail, steering first to the west to get clear of the reef which lies just opposite the shore. The coast of South-East New Guinea is, like that of North-East Australia, flanked by a barrier reef, which indeed does not show so even and regular a formation as its Australian rival. It is more frequently interrupted by water, and in many places quite submerged. Beginning at Port Moresby, it accompanies the coast towards the south-east at a moderate distance, following all its projections and bays, but in a more rounded, softened contour. It also extends far beyond the south end of New Guinea, running south-east as companion to the Louisiada Archipelago, and only ending opposite the most south-eastern island of the latter, called "Sudest." It is certain that Sudest has once upon a time formed the south-eastern point of New Guinea, the Louisiadas being nothing but the mountain tops of this former south-east spur of the Papuan island.

The Reef Channel between the coast and the reef itself is very difficult of navigation, and is far more obstructed by scattered coral reefs and sandbanks than the channel of the great Australian Barrier Reef. Our captain, much too timid to attempt the "inner route," steered all the time at a respectful distance from everything resembling a reef.

Hardly had fifteen minutes elapsed since our starting from the shore, when suddenly we felt a big jerk, and at the same time heard a grating noise. The keel of our boat had run upon the bottom, bringing us to a dead stop upon a sandbank situated before the entrance into the Reef Channel. Such an accident may easily happen, particularly in waters so insufficiently surveyed. I own that we ought to have taken the precaution of sounding; now, however, nothing was to be done but to get out of this scrape as best we could. Unluckily our good captain did not show himself at all equal to the situation. Low water having set in, every lost moment was of fatal importance. His commands, however, were uttered so slowly and tardily that considerable time elapsed ere the sails were furled, whereupon he tried to push off the boat by the oars. It lasted an age till he conceived the brilliant idea of disburdening the ship by throwing out the anchors and by letting the heavy anchor-chain into the dinghy. The afore-mentioned dealer, Swords, whom I had taken on board to bring to Aroma, advised us as follows: a few of us were to get into the dinghy and to drop the anchor 100 yards farther back into deep water, thereupon to wind the boat by the windlass, to which we all of us put our hands, away from the sandbank and nearer to the anchor. All this we did without its fulfilling the desired purpose, as the water had got too low during our previous injudicious attempts. A great pity his good advice was not proffered half an hour earlier! Now all our efforts were in vain. The water sank more and more, poor *Hekla* turned over to one side, and soon offered but a poor abode to any one untrained in alpine sport. In spite of all this, we remained on board, hoping to get free by the next high tide. At 5 P.M. the high water came, our boat began to resume her natural position for some hours, but soon toppled over once more. We had to wait another twelve hours until the stronger nocturnal tide released us out of our wretched position.

This, however, was by no means the end of our misfortunes. A strong south-east wind blowing straight in our teeth, we had continually to tack, making no way whatever. On that afternoon we got no farther than Kerepunu, a village situated on the promontory which

forms the eastern border of Hook Bay. The distance from here to Aroma is not great. The wind, however, dying away and the navigation being very dangerous, we had to give up all hope of reaching our destination that evening. On my proposing that we should anchor off Kerepunu, the captain declared the water to be too deep for this purpose unless we approached very close to the shore, which, considering the unknown and difficult navigation, he did not advise; he preferred to tack up and down the coast all through the night. As at that time I used to leave the decision of purely nautical questions to the captain, I consented, and laid myself to sleep in my cabin. Coming on deck next morning and expecting to find we were quite close to the land, great was my astonishment on beholding nothing but water on all sides of us. At last I discovered in the blue distance, about forty miles from our ship, the contours of the coast which we were slowly approaching, carried along by a light breeze. Was our boat, was I myself, bewitched, or what in the world had been going on? The captain had just gone down to sleep, so I asked the Manila-man, Fillis, who was steering, for the explanation of this riddle. "Oh," said he, grinning all over, "the captain has been afraid of the reefs near the coast, and instead of tacking up and down, has taken one single tack out into the sea." Only just before my appearance on deck he had turned towards the land. Now my patience was at an end. Giving the sleeping pilot a shake, I furiously asked him whether he thought that I had come to New Guinea to sail up and down before the coast. He said in excuse that he had wanted to steer so far seaward as not to hear the breakers near the reefs. This, however, was a most exaggerated precaution, as the noise of the surf during tranquil nights is heard at an enormous distance, the more so when the wind, as was the case, blew from the land. Nothing was now to be done but to communicate to the captain my desire to be henceforward consulted about every nautical manœuvre, and to be acquainted with the nature and reasons of all measures taken by him.

Though I have all my life refrained from commanding in matters which lie outside my competence, I saw the absolute necessity of taking the lead in this instance, and future events justified my resolution. In very critical situations a resolute man will often behave himself more to the purpose than a very cautious one, and an intricate navigation, such as that near the coast of the Coral Sea, demands not only prudence but a good share of determination and pluck. Our crew, of course, perceived the

incompetence of the captain as well as we did, and soon began to disregard his authority. Whilst the men obeyed Douglas and myself without the least contradiction, they showed a passive resistance against many of the captain's orders, let him command and talk as much as he pleased, and they did what they liked. I had frequently forbidden the men their outrageous behaviour, finding it pitiable that a white captain should be unable to enforce the obedience of a crew of South Sea islanders.

Of course that day's ill-luck was by no means at an end. Soon after sunrise the wind dropped and a perfect calm set in, which, till eleven o'clock, was not broken by the slightest breeze. Thus it was 4 P.M. ere we reached Aroma.

Aroma is not the name of one village, but of a district comprising fourteen villages, conspicuous by their size and importance. We cast anchor off the village Parimata, where Douglas and I took up our abode in the house of the teacher, a Tahitian called Feinaore. A village of yet greater size and importance than Parimata is Maopa, the residence of the intelligent Tabuta, likewise a Tahiti teacher. Maopa is the handsomest village I have seen in New Guinea. One may as well consider it a collection of villages, and the number of its houses and inhabitants would even justify one in calling it a town. Its population is proud and valiant, and nowhere else have I seen such fine specimens of the Papuan type. One day, when I was sitting on the verandah of Tabuta's house, half a dozen men came up towards me, none of whom measured less than $5\frac{1}{2}$ feet, and whose bodies were both elegantly and powerfully built. The one thing marring the harmony of their limbs was the weak development of the calves, according at least to our ideas of beauty. These men, however, were still surpassed by the celebrated chief, Koapena, whom I went to see at his house at Maopa. He stands more than six feet high, possesses most powerful limbs and splendidly-developed muscles, and is all in all a true black Hercules. At the same time he is every inch a king, his sharply-chiselled features bearing a proud and intelligent expression. The aquiline shape of his nose reminded me of the portraits of Rameses the Great. He is considered the most powerful chief in all New Guinea, and his word has an unlimited authority all over the populous and renowned Aroma district. Terrible as an enemy, he is also known to be a firm and faithful friend. In 1882 seven Chinese tripang fishers, who had landed near Aroma, relying on their firearms, made themselves guilty of outrageous misdeeds against the native girls and women. Then Koapena came down upon them with his

warriors, killed them all, and decorated the posts of his Dubu with their daintily-scalped and polished heads. Later on, when the Kalo missionaries were killed and a general excitement and lust of blood spread over the whole of that coast, Koapena's strong arm protected the Aroma teachers, and did not suffer a hair of their

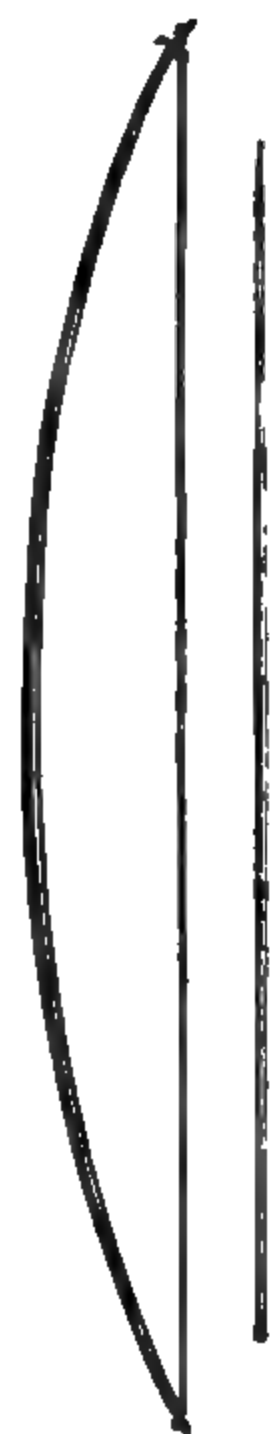
Men of Aroma.

head to be touched. Still, it was considered safer to call away the teachers also from here. This sign of distrust deeply wounded the noble-hearted savage. He watched over the forsaken mission-houses, and took care that nothing should be touched or taken from its place. When, after a long while, Mr. Chalmers came to see him at Aroma, he turned his back on that gentleman, as much as to say he would have nothing to do with him. At

last, however, being unable to master his feelings, he turned to Mr. Chalmers, saying, in a sad and reproachful voice, "Oh, Tamati" (this is the name by which the natives used to call Mr. Chalmers), "how wrong have you been! You might well have committed your children to me. Well you ought to have known that here no harm will ever come to you or any one belonging to you."

We, too, were welcomed very kindly by Koapena, although we were not deigned worthy the honour of rubbing noses with him. This civil but not very elegant custom is the habitual form of welcome in the more western districts, near the Gulf of Papua. We Europeans are not loath to dispense with this expression of amity. Unpleasant as it is for any white man to bring his face in contact with that of another of his own race, it is doubly so where the saluting person is a Papuan, given to the chewing of betel, and ignorant of the existence of soap and towel. Still in some parts of New Guinea it is impossible to avoid rubbing noses with dozens of aborigines.

On wandering through Maopa I was particularly struck by the carvings and coloured patterns decorating many house-posts. The men seem to wear fewer



Bow of palm-wood, with rotang string and bamboo arrow (St. Joseph River).



Fishing spear (Aronia).

Spears (Aronia)

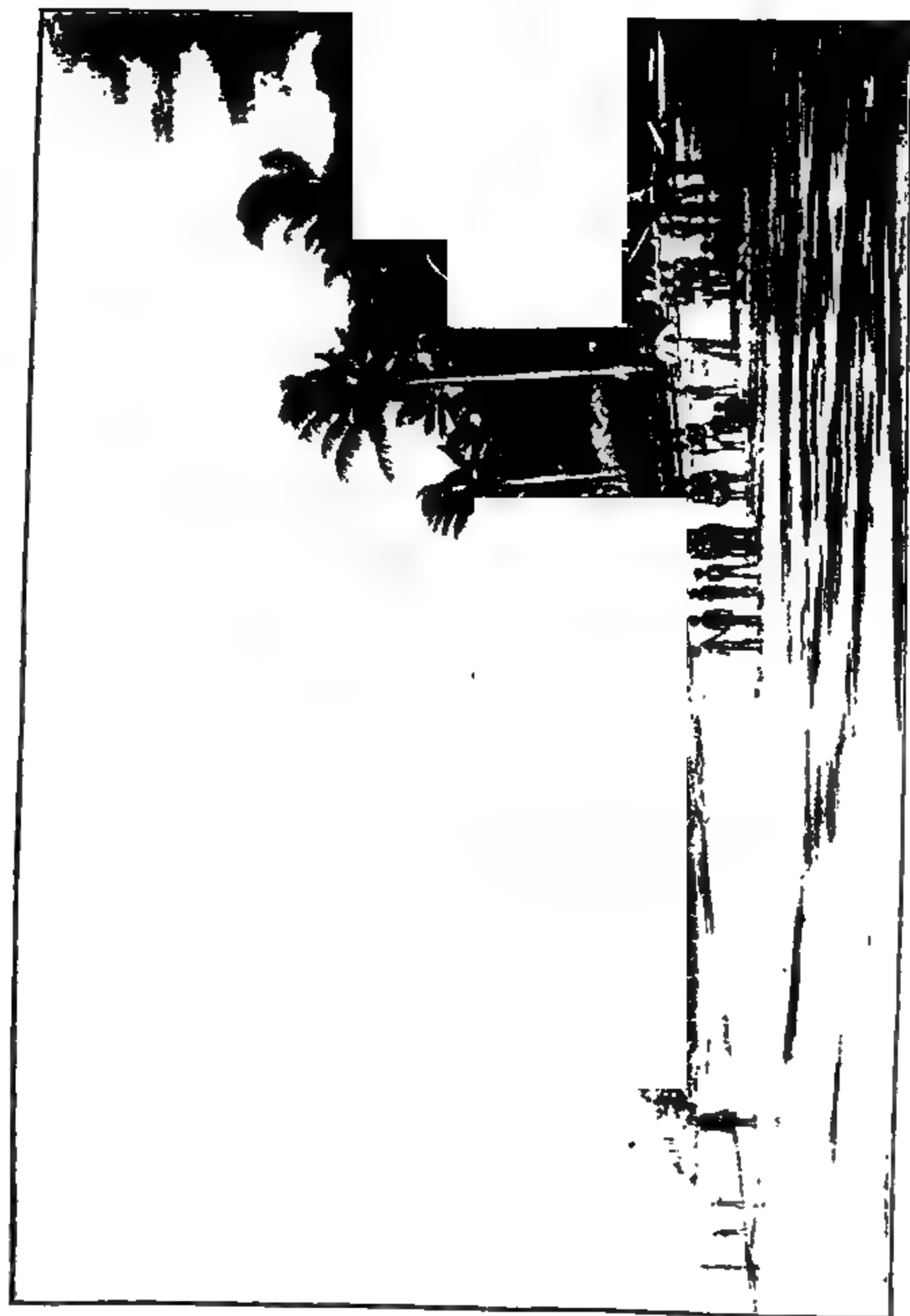
ornaments here than in other places ; many of them were completely naked, except for a narrow ribbon round the loins and between their legs. Handsomely-carved spears of uncommonly hard wood, its colour very much resembling ebony, and clubs, are their principal weapons. These spears, 7 to 10 feet in length, are often carried about by the men when strolling through the village, occupying, as it seems, the place of the European gentleman's walking-stick, and serving rather as an ornament and light support than as weapon. Here I also saw enormous fishing spears furnished with a number of sharp points like that represented on page 359.

Previous to our starting I took a picture of the Parimata shore, and a big party of children, who turned up as soon as they saw my preparations. Douglas arranged them in picturesque groups, and kept watch over them and their good behaviour in quite a fatherly way. I have given the illustration of this scene, not because it contains any very interesting item, but as a type of the average tropical landscape. This sort of landscape, a shore fringed by cocoanut trees, and enlivened by coloured natives, may be seen in the West Indies as well as in Africa or Ceylon, or the Celebes, and the globe-trotter who passingly touches these coasts without having the time or taking the trouble to enter further into the nature of things, might readily arrive at the conclusion that the tropics resemble each other all over the world. This great and widespread mistake is further nurtured by the descriptions of many travellers, who speak in such general terms of palms, lianes, orchids, parrots, and gigantic serpents, and of the savages and their ways and customs, that their words would seem to apply to almost all the tropical shores of the existing oceans.

The distance from Aroma to the South Cape, our next goal, was considerable, about 200 miles, and this we had to conquer by very tiresome tacking against a fresh south-east breeze. The inhabitants of the coasts along which we sailed, above all those of Cloudy Bay and Orangery Bay, are feared as particularly savage and treacherous. There are very few missionaries living among them, so that the influence of the Government on these districts is as yet very slight.

It took us four days to get to the South Cape, which, in reality, is not the south cape of New Guinea, but an island opposite the southern point of the mainland called Suau.

During all this time we had much trouble with our captain, who, as soon as the wind was tolerably fresh, could not reef the sails short enough, and who, whenever it grew really strong, completely



Shore with cocoa-palms, near Aroma.

drew in the foresail, thereby preventing us from getting on at all when forced to tack. One may say that that good man lived in continual fear of the foresail. On our approaching a place where we wanted to anchor, he regularly let it down much too early. In consequence, we always had the greatest difficulty in getting on against the stream, and had to anchor two miles instead of half a mile from the shore. Things like these, though trifles in themselves, when incessantly recurring are apt to spoil one's humour, the more so, if the perpetrator of these feats shows such conceit and silly pride as did our captain. It was, moreover, rather difficult for us to interfere with the sailing manœuvres of an old sea-bear like him, who repeatedly assured us, by the most solemn oaths, that to put up more sails in such a wind would mean certain destruction. My later experiences taught me how wrong his assurances were, and that our good *Hekla* was well able to tack in a much stronger breeze, with only one reef in the main-sail and the foresail, and with no reef at all in the jib.

CHAPTER XIV

NEW GUINEA: FROM THE SOUTH CAPE TO THE EAST CAPE

THE South Cape Mission-House is situated on the little island of Suau, and was at the time of our visit inhabited by but one Samoan teacher called Vaitupu, with his wife and child. The man was somewhat shy, but kind-hearted and amiable; the wife a pretty young woman with splendid eyes, and the little eight-year-old girl the exact miniature of her mother. Up to a short time before my visit a white missionary, Mr. Walker, had been stationed on Suau. Just now he was staying at Sydney, intent on perfecting himself in nautical matters, an accomplishment necessary to a man occupying so responsible a position as was his on this coast. I made his acquaintance at Cooktown later on.

Vaitupu and his wife took care of us in a touching manner. The houses of the Polynesian missionaries are somewhat better than the huts of the aborigines, but nevertheless primitive according to European notions. Almost everywhere, however, one finds a pair of tolerable beds with mosquito curtains, always a great comfort to the traveller. The food of the teachers hardly differs from that of the Papuans. They prepare their meals out of the taros, yams, bananas, and cocoanuts they barter from the aborigines. Accustomed to simple food from their childhood, they feel no need of a more luxurious fare, which would have to be imported from elsewhere, and are perfectly contented with what the country offers them. This is partly the reason why their work is so much less expensive than that of the white missionaries. Animal food is eaten as rarely by them as by the Papuans themselves, who only on exceptionally festive occasions treat themselves to pork or dogs' meat, the pig and dog being their only domestic animals. Besides these two festive dishes, the animal food of the Papuans consists

of game, the wallaby, and in some districts of human flesh, but principally of fish and turtle. At the mission-houses some poultry is generally kept, and our visits regularly caused the death of a few of these winged house-mates. Vaitupu and his wife killed one of their pigs in our honour, a noble deed we duly appreciated.

Suau is a little, mountainous, densely-wooded island. The small native village lies at some distance from the mission-house near the shore. It is charmingly situated, and almost hidden among woods and plantations. The channel, which separates the island from the mainland, appears only like a thread of water, beyond which the mountains rise in a graceful and stately line, descending towards the sea, however, in a steep decline. All this is covered by a rich primeval vegetation, and mountains, woods, and sea combined form a picture of surpassing charm.

The aborigines of these parts are much smaller and less finely built than those of Hula or Aroma, without differing very much from the latter in hue. Like all Papuans, they are great friends of ornament; and, besides the elaborate decorations lavished on their noses, I noticed a particular predilection for headgear consisting of brilliant diadems of bird-of-paradise plumes or brightly-coloured parrot feathers.

On Mr. Chalmers and M'Farlane first landing here, fourteen years ago, the aborigines were very savage and given to the most horrible cannibalism, so that the lives of the two peaceful whites and their Polynesian helps were several times severely threatened. Since then the presence of the missionaries has exercised a taming and ennobling influence on the inhabitants, working on their manners and customs most favourably, and civilising them in every direction.

During our sail we had contrived to learn some words of the native language, particularly of the Motu dialect, and also somewhat of the Hula and Aroma. Here we were surprised to find quite another dialect, as also, when progressing still farther westward, to Jule Island (Maiva district) and Motu-Motu, where quite other dialects appear. Also, to the east, towards Milne Bay, the dialect is essentially different. This multiplicity of languages is probably chiefly owing to the fact that some districts have been maintaining enmities towards each other for hundreds of years, and thus have been kept entirely separated. As may be imagined, this circumstance engenders considerable difficulties for the traveller and collector.

It was my desire to undertake a longer trip inland to collect animals and, above all, to shoot birds-of-paradise. I was, however,

entirely at a loss how to set about this business, as I did not succeed in explaining my intentions to the aborigines. The teacher, whose help, though most readily offered, was not of much avail on account of his ignorance of the English language and lack of general intelligence, told me of a Chinese called Assi, who lived close by on the mainland, and who was known to speak some English. Assi was a dealer who managed his modest business at his own risk. He had turned Papuan in all his ways and habits, and his celebrated English, if ever it had possessed any claim to that title, had shrunk to a vocabulary of half a dozen English and Polynesian words. All I could make out was that he considered "kaikai" an English word meaning food, and that by "pigeon" he did not mean this special kind of bird but any winged creature, for instance, and especially the bird-of-paradise. As, however, he was tolerably intelligent, I succeeded in making myself pretty well understood by him. He explained to me that to approach the best haunts of the birds-of-paradise and other rare species, I should have to go up the Gara River. At the same time, he offered himself as my guide, and undertook to bring me up the river in his own canoe, rowed by seven aborigines. In short, he proved himself a most useful individual. Unluckily there was a little misunderstanding as to one point of the programme, which consisted in my thinking that it would be a journey of a day or so, thus providing myself neither with a change of dress nor with coverings and provisions. My entire equipment consisted of my gun and the necessary cartridges, a butterfly net, some bottles in which to preserve my collections, and, finally, of some pieces of tobacco for bartering food from the natives. As I made out afterwards, Assi had planned an expedition of at least one week. The queer fellow, however, although he saw my scanty equipment, had refrained from calling my attention to this. As he approached the mission-house in the morning to fetch me, the missionary, Vaitupu, came running out and eagerly asked to be taken with us. As he declared himself greatly interested in the birds and my methods of obtaining them, I did not raise any objection and let him enter our canoe, accompanied by a big parcel of things prepared for him by his attentive little wife, so that he was by far the best equipped of our party.

At first we rowed for some hours along the coast to the east, until we approached the mouth of the Gara River. Here a large native settlement, situated in the midst of extensive plantations, caused us to stop to buy some eatables for our trip.

I was much disappointed on finding that my men brought me nothing but taros and yams (bulbous fruit I do not at all fancy) instead of the more agreeable cocoanuts or bananas. The banana is a real pearl among tropical fruit, and just beginning to be duly prized in Europe, where it is imported chiefly from the West Indies. Delicious as it is if eaten in its natural state, it is likewise savoury when cooked or roasted, which it may be in different ways. Generally it is simply boiled like any vegetable, or sliced and baked in grease (not unlike the baked apple-slices which sometimes appear on the European table). Cocoanuts when young are quite filled with a half-milky, half-watery juice of a sweet taste, furnishing a delicious refreshment after a long walk in the scorching heat of the tropical sun. I can but advise any tropical traveller, when crossing uncultivated country, to quench his thirst, as much as possible, with the milk of cocoanuts, for this liquid is perfectly free from bad germs, which frequently abound in the water one drinks unboiled. The older a coconut becomes, the thicker grows the inner covering or lining of the shell, thereby diminishing the room occupied by the juice. This lining is of a white colour, at first thin and jelly-like, but growing more firm and hard by degrees. It is a substance containing great quantities of oil, which is put upon the market under the name of "copra," and forms one of the most important articles of export from the tropics to Europe. When eaten fresh, this "flesh" of the ripe coconut forms, at least to my taste, a very agreeable delicacy, nourishing and of a slight nut-like flavour.

We now began to row up the river, entering upon one of the finest and grandest landscapes I ever saw. Some miles above its mouth the stream becomes rather narrow, still, however, representing a fine sheet of water, framed by a vegetation surpassing in richness and luxury anything that can be imagined. Splendid nipa palms grow into the very river, and on both its banks we see, proudly standing out against the sky, the giant trees of the primeval forest, every one of them representing not only an individual, like our own forest trees, but a little world for itself, so richly is it adorned by climbing and hanging plants, so closely are its trunk and branches covered by wreathing lycopodia and by epiphytic ferns and orchids. It was, however, not only the luxuriance of the vegetation which formed the particular charm of this landscape. This luxuriance is a feature common to primeval forests in all parts of the tropics, where the soil is fertile and the rains are frequent and of a certain continuity during all the year. When once you

get accustomed to the enormous quantity of plants thickly entangled and heaped together within its boundary, such a forest may even present a severe and monotonous aspect, the coloured blossoms almost disappearing amongst the enormous mass of green leaves. Besides, it must be stated, as concerns diversity of colour, that all this cannot be compared to the sight presented by our orchards when in bloom, or by our meadows when arrayed in their flowery garb on a fine morning in May and June. It is true that many kinds of the plants occurring in primeval woods bear brilliant and handsomely-shaped blossoms, above all, the epiphytic orchids, the pride of our conservatories. But in the first instance the blossoming period of these flowers is distributed over the year, instead of being, as in Europe, confined to a few months. Secondly, within the primeval forest the struggle for a ray of sun, so rare a guest amid the general dusk, has developed the organs serving the reception and disposal of the sun's rays, viz. the leaves and other green parts of the plant, to an extraordinary degree. Every plant, every tiniest member of this green world greedily stretches out its leaves towards the light, which has to fight its way through the thick roof of foliage, so that a sombre green is everywhere the reigning colour.

Wallace was the first to direct attention to these peculiarities of the virgin forest. To this day, however, in the fancy of most Europeans the virgin forest resembles the orchid-house of a flower-loving prince or an English lord, and there are other matters as to which the picture most people construct of a primeval forest is usually erroneous, because drawn from the exaggerated descriptions given by over-enthusiastic writers, supported by what one has seen in zoological gardens and museums. Just as the fancy pictures a forest adorned with the brilliant and gigantic blossoms of orchids and rafflesias, so it conjures up parrots, cockatoos, rhinoceros-birds, with which it peoples the trees, herds of monkeys hopping about the branches, elephants and rhinoceros striding along in the shadow of the wood, and an army of brilliant butterflies and metallic beetles flitting round the fiery blossoms. The enjoyment of all this splendour is indeed somewhat disturbed by the presence of lions, tigers, panthers, and venomous serpents hiding in the grass, whence they attack the unheeding wanderer, whilst the cruel savage sits scrubbing his pots for boiling the next missionary that chance should lead into his way. Now it is true that all these plants and animals are to be found in the tropics, and are by no means a mere invention of sensational books of travel; but still they are seldom so neatly assembled in the same place, nor so obvious to the

eye as one might think. A man may live for ten years in tropical Africa without ever seeing a lion, or on Java, Sumatra, and in India, without encountering a tiger, unless he inhabit a district particularly haunted by these beasts, or unless he be a passionate sportsman. But even then months may pass without his lighting upon one of the big felines. To a certain degree the same is the case with serpents, which in some regions are very numerous, but at the same time most careful to hide from the view of man. There are mighty primeval forests in which you hardly see or hear a bird in the entire course of a day, and which are far more silent and forlorn than our German woods in spring or summer. As soon as darkness sets in, the scene will indeed change entirely; then the whole forest resounds with the voices of its inhabitants, with the screaming and piping of birds, and particularly the crying, howling, or snorting of the various mammals.

Our row up the Gara River was particularly charming and interesting, because for once the primeval forest did, in fact, present the scene imagined by untravelled people. Here indeed the wood swarmed with birds, and resounded all day long with their different notes and voices. The river-banks were studded with mighty trees of glorious structure, which were almost covered with great blossoms of a lively red. These seemed to possess an irresistible attraction for the brush-tongued parrots, big parties of the brilliant *Lorius hypoenochrus*, and of several kinds of *Trichoglossus*, being seen to settle down among the foliage, wrestling amid loud shrieks for the access to the sweet nectar of the calyx, doing the wildest gymnastic tricks along the branches, and presenting a scene more frequently viewed in a well-furnished aviary than in wild nature. From the crown of the highest trees the voices of the white and black cockatoos are continually heard, then, again, you see a specimen of the stately *Electus pectoralis*, resplendent in the green, blue, and scarlet hues of his feathery dress. Now a kingfisher is seen darting like an arrow over the surface of the water. Besides the genuine short-tailed halcyons and kingfishers, which feed on fish and water-fowl, these regions harbour a genus surpassing in beauty of plumage and elegance of form all the others, and which deserves to be called the king of kingfishers. It is the genus *Tanyptera*, conspicuous by the brilliant hue of its blue plumage, which is most delicately shaded and beautifully set off by the white of the abdomen and tail. This remarkable bird is further decorated by a beak of coral red and by a long tail, the two middle feathers of which are immensely elongated, and spatulate at the end. *Tanyptera*

does not feed on water-animals obtained by diving, but on insects and land-snails, which it darts upon like a falcon from its seat on the bare branch of a tree. In the south-east of New Guinea the species *Tanysiptera galeata* is very frequent. Other species may be found in North Australia (Cape York), North and West New Guinea, Aru, and the Moluccas. Beyond these limits, however, this beautiful genus does not extend.

A sound we continually heard was the loud cooing and restless flutter of the fruit-pigeons, *Carpophaga* and *Ptilopus*, among the branches of the fruit-bearing forest trees. Many of these pigeons may well be compared to the most handsome parrots as regards splendour and brilliancy of plumage. On the whole, the Australian region surpasses all other countries on earth by the number of its pigeon species and the conspicuous colouring of these usually insignificant-looking birds. The rich development and lively hue of the pigeons in the Australian region may be justly ascribed to the entire lack of monkeys, lemurs, weasels, and civets, *i.e.* to the absence of animals fond of eggs and young birds, and therefore particularly dangerous to so helpless a family as the pigeons, and to one so awkward and careless in the art of nest-building.

In New Guinea and the neighbouring districts we not only find the most brilliant, but also the largest and most peculiar of all pigeons, the crown or goura pigeons, which attain the size of a goose, and are crowned by a fan-like erectile diadem. The handsomest headgear of this sort is to be found in the great species *Megapelia (Goura) victoriae*, whose prettily-fringed feathery diadem is the loveliest headgear ever worn by a bird. These crested pigeons are common in New Guinea. During daytime they are generally seen moving about the ground, where they feed on fruit dropped from the trees. When scared, they settle on the next best branch, and can be shot without any difficulty.

Thus we rowed up the river during one whole day. In the afternoon the sky clouded, and we became drenched mercilessly by a tremendous shower to which we were exposed in our open canoe, which was entirely devoid of any shelter. The rain having ceased at last, my natives, from whose naked limbs it had simply dripped off, proposed to continue the journey. I, however, feared fever, if I remained sitting for a longer time in my wet apparel. So we chose a deserted hut near the river for a resting-place, and, having no change of dress, I dried my clothes on my body by taking a good constitutional in the wood, and by indulging in a tough bit of climbing. The wood framing the right

bank of the river was uncommonly fine and had many peculiarities. The term "primeval forest" generally suggests an idea of something impenetrable, and of a vegetation so densely intermingled as to force a man to cut his way through its mazes with knife and axe. The dense shrubs and brushwood, the various climbing plants, palms, and lianes, incessantly arrest the wanderer's progress, laying a thousand obstacles in his way. A primeval forest spreading over the slope of a mountain will almost always show this character. The crowns of its trees, though dense in themselves, will not lie on the same level, but descend with the declivity of the mountain, and, thus prevented from interweaving, will allow sunbeams to penetrate the foliage, reach the ground, and propitiate the growth of a quantity of lower plants. Now most of the true primeval forests are situated on the sides of mountains, where we find all necessary conditions for condensing the moisture of the air. In rarer cases we observe a luxuriant forest thriving on level ground, but this only where the climate is altogether wet and the country marshy. Here it is that the crowns of the gigantic trees will form such a dense and almost solid roof that no beam of light can reach the ground. No undergrowth whatever can thrive in this darkness. These swampy woods are therefore much easier of access, and luckily the greater part of the forest bordering the Gara River was of this kind. Its character reminded me somewhat of our own woods, except that the trunks of the trees were more mighty, the darkness below more intense, and the ground extremely boggy. Hardly any underwood was to be seen below the trees, instead of it a quantity of ferns and lycopods. The ground being far and wide covered with rotting wood, I had some difficulty in making my way among the mossy roots, the slippery wood, and over the soft soil. I loathed my boots, wishing they were at least nailed, and played a sorry part near the aborigine accompanying me, who, barefooted as he was, stepped lightly along as if walking on a well-kept path, whilst I, the product of a higher civilisation, had to crawl along in a very helpless fashion. Not that our European shoes have not advantages of their own. While protecting the feet from cold in our own climate, they serve in the tropics as a defence against thorns, bamboos, and cutting grasses, and against insect and snake bites. Nevertheless, under circumstances like the above, they cause an almost ridiculous clumsiness and awkwardness of gait, and make one feel quite ashamed of one's culture, and much the inferior of the unshod savage, whose help in the simple arts of walking and climbing one accepts with a certain reluctance.

Above our heads we incessantly heard the voice of the bird-of-paradise, above all that of *Paradisea raggiana*, very frequent in these parts. Besides this we principally found *Paradisea apoda*, the first known species of birds-of-paradise, which, until a short time ago thought to be limited to the Aru Islands, was subsequently found to exist in many parts of New Guinea. Also the charming little *Cicinnurus regius*, and the brilliant *Epimachus (Seleucides) nigricans*, which belongs to the group of long-billed *Paradisea* or *Epimachidae*, are by no means rare. Besides all these birds, thousands and thousands of cockatoos were heard screeching amid the trees. Dusk, however, had begun to set in, and it was impossible to secure a good shot, so that I was forced to return to our nightly quarters empty-handed. When we arrived there it was quite dark. Assi and the men had settled down comfortably, lying on the elevated floor of the hut, whilst one of the natives had lit a small fire in a corner and was intent on cooking a meal of taros and yams. Though this was the only thing we had, and I had taken nothing since the morning, I was utterly unable to appease my hunger with this kind of food. These bulbs have something nauseous to my taste whenever I am forced to eat them as *pièce de résistance*, and though hunger be the best sauce, it will only in extreme cases conquer an idiosyncrasy. I spent the night curled up on the ground of our hut, without any covering and in close proximity to Assi, Vaitupu, and the seven natives. Still I slept well, and woke the next morning strengthened by the night's rest but very hungry.

After having rowed on for some hours, we approached the border of the hunting-ground pointed out to me by Assi. The river here flows in serpentine curves, and the forest partitions between these are particularly luxuriant and fine, the haunt of innumerable birds, beautiful butterflies, and various other insects. Assi and I now left the canoe, and, accompanied by a native, gun in hand, we each set out to shoot. We passed through the forest lying between the river curves, then crossed the latter and entered the next partition. It was a wonderful scene, and I have never seen a similar harmony between luxuriant vegetation and rich animal life. The latter was most conspicuous in the mornings and evenings, when the woods echoed with the quaint cry of *Paradisea raggiana*, sounding like "huck, huck, huck, huck," the softer, more flute-like tune of *Cicinnurus regius*, and the grating voice of the mighty black cockatoo, which seemed very abundant in these forests.

I generally had some difficulty in perceiving the birds-of-paradise,

as they are wont to disport themselves at a considerable height among the dense and sombre foliage, which damps the brilliancy of their metallic tints. The eye of the aborigine, much more expert than ours in seeing amid this crepuscule, discovered them at once, whilst I only found them out after riveting my attention on a certain group of foliage fixedly and for a considerable time. The search is indeed facilitated by the noisy communicativeness and the incessant chatter of the birds, which indulge in perpetual calling and clucking, by their continual flights up and down, in short, by the nervous restlessness which prevents them from settling down for a single minute. One need not be a naturalist to feel intense delight in observing these beautiful creatures in the freedom of their home life. Their beauty may be said to surpass that of any other animal; for although equalled by some Colibris as to the brilliancy and metallic lustre of their plumage, they not only surpass them in size, but also in the wonderful appendages of their body, the fantastic headgear and shoulder-capes, their curiously elongated side feathers, and the proud and striking shape of their tails. The variety in the arrangement, the structure, and colouring of these appendages is astonishing, every species presenting a new miracle. The greatest wonder is that this abundance of lustre, colour, and shape seems regulated by a superior taste, which reigns supreme over all this brilliant medley of detail. And, finally, we admire the merry and sympathetic ways of these birds, which seem to revel in their own beauty and to unfold their lovely plumage with a certain pride, not as haughty, self-contented snobs, like the peacocks, but as happy and radiant children of their glorious home.

The birds-of-paradise are throughout natives of New Guinea. They are limited to the main island and to its satellites, the smaller islets which were connected with it up to a recent period. One single genus, the celebrated rifle-bird, *Ptiloris*, occurs in North Australia, one species, *Semioptera Wallacei*, is found on the Moluccas (Batjan). These, however, are exceptions to the rule which proves that the family is strictly Papuan.

I must refrain from giving a further description of the birds-of-paradise, other naturalists, as, for instance, Wallace, Sharpe, Rosenberg, and d'Albertis, having devoted far more time and trouble to the pursuit and study of these birds. The former particularly has painted so delightful and glowing a picture of them, that my own attempts at describing them could be nothing but a feeble repetition.

On that day I shot two *Paradisea raggiana*, one female and one male, with incompletely developed plumage. Besides, to tell

the truth, I missed several times, as it was rather difficult to be sure of a shot at the little creatures, flitting about so restlessly among the highest branches of the green bowers. Like honey-suckers, the birds-of-paradise feed on the nectar of large blossoms and on fruits, and insects, which they hunt by flitting adroitly from twig to twig and slipping cleverly through the mazes of leaf and blossom. On noticing a pursuer they do not fly away, but prefer to hide within the densest parts of the foliage, and this trick succeeds perfectly in most cases, in spite of their brilliancy and conspicuous form. It is probably known to most of my readers that the birds-of-paradise, though forming a family by themselves, are closely related to the crows. That the latter, more conspicuous for cleverness than for beauty, should play a part in the origin of the most exquisite of all bird families, is a circumstance which must be chiefly ascribed to the peculiar conditions reigning in the home of the birds-of-paradise. It is the total absence of monkeys, prosimiae, cats, martens, and squirrels, the most dangerous enemies of forest birds, their nests and nestlings, which furnishes so favourable a condition for the development of the birds' beauty of form and brilliancy of colour. The birds of prey are unable to do much harm to the inhabitants of these dense forests, so that the want of protection in this case has not counteracted the efficacy of sexual selection.

The aborigines of New Guinea pursue the birds-of-paradise all over the island, having a great predilection for their feathers, which they use for the manufacture of diadems and all sorts of headgear, as well as for the adornment of their bodies generally, and for the decoration of their tools and weapons. In North-West New Guinea, where the natives have lived in connection with the whites for a long period, they even practise the hunt for commercial reasons, and, since olden times, have had yearly to deliver numerous skins as a tribute to their sovereign, the Sultan of Tidore. Besides this, the Tidore and Ternate people are in the habit of crossing to New Guinea to hunt birds-of-paradise. From Ternate they are sent on to Europe, where we meet them in our museums and on the bonnets of our ladies. In the whole of South New Guinea, however, the natives keep on the hunt exclusively for their own purposes. Knowing the trees on which the birds are accustomed to assemble at sunrise or sunset, one of the men climbs one beforehand, hides carefully within the foliage, and is able to stun and kill a number of birds by his well-directed arrows, ere the other birds perceive the danger and avoid the inhospitable surroundings.

After having rambled about all day long and caught a nice quantity of fine butterflies and interesting beetles, we returned to the river at about four o'clock. Here we heard from one of my men that our canoe, which meanwhile had been slowly rowed up the windings of the river, was not far off. We had had to cross the river more than a dozen times in the course of that day, and, the water being more than three feet deep in several places, I preferred to be carried across by one of my black companions, for fear of catching a fever by continually wetting my clothes and drying them on my body. In the course of the afternoon a number of natives had joined our little party, and I must own that it was with some reluctance that I confided myself to the backs of these savage fellows; for as long as you are carried you are of course entirely helpless, and the temptation for the aborigine to gain possession of your goods and chattels by a simple stroke on your head or thrust into your body with his club or spear must at times be very great. The body of the white man does not seem to excite the cannibalistic desires of these savages, for it is very rarely noted that whites who had been killed by aborigines have been eaten. Their limbs have been found cut up into pieces, their heads preserved as trophies. Our flesh, however, does not seem to tickle the New Guinea man's palate, a circumstance we may probably attribute to our predilection for animal food. They seem to consider the Chinese a great dainty, New Guinea epicures affirming that they possess a most savoury and juicy taste, "much like pork."

At last we reached our canoe, I almost famished with hunger and in great hopes of finding something tolerable to eat. But, again, there was nothing but taro and yam, and one single juicy cocoanut. Now, however, my patience and forbearance were exhausted, and though I might have set out shooting for another hour, I preferred a prompter method. So, without much ado, I skinned my two *Paradiseas* and threw their bodies into our cooking-pot, and never before nor after did I relish any repast as much as these birds, which I consumed lying at full length under the mighty trees of the river-side, surrounded by my swarthy, dark-maned Papuan companions. It was indeed the most singular meal of which I had ever partaken. Being of a truthful nature, I refrain from setting up the *Paradisea* as a very savoury bird. All I can say is, that I enjoyed it immensely then and there. The only check to the enjoyment of this meal was its scantiness compared with my overwhelming appetite. Whilst brooding over this fatal incongruity, I suddenly remarked a large bluish-gray heron, which had settled

down on the river-bank not far from us. Crawling up to it on all fours, under cover of bushes and stones, I succeeded in getting within shot, and secured a splendid roast for our supper-table, the proportions of which enabled all of us to appease our hunger. I can even affirm that I liked the taste of my game, though the flesh of herons and other aquatic birds living exclusively on fish is usually considered as absolutely uneatable. This idea, however, results from an error. The disagreeable "fishy" taste possessed by the flesh of herons, diving-ducks, and sea-gulls originates exclusively in the fat contained in their subcutaneous tissue. It therefore disappears entirely if the animals are not roasted in their skin, but previously skinned and deprived of every vestige of fat. Thus they offer a tolerable, if not exactly savoury dish.

On the next day we continued our shooting. I shot another full-grown male of *Paradisea raggiana*, whilst Assi killed a charming specimen of the lovely little *Cicinnurus regius*, and, besides, an immense black cockatoo, *Microglossus aterrimus*, one of the largest parrots existing, and furnished with a bigger and stronger beak than any other. This beak enables the bird to open even the strong fruits of the canary-tree. It serves it as saw and borer, and in the place of cutting nippers, whilst its tongue, which is horny at the end, is useful in removing the kernels or the flesh from the tapped or broken-up fruit. This cockatoo is less sociable than its noisy white cousins. I never saw it otherwise than singly or in pairs, and not once in great numbers.

Of frequent occurrence in these parts is the hornbill, *Buceros plicatus*, the mighty crooked beak of which is furnished, though not precisely with a horn, still with a horny prominence marked with cross-running folds. Its presence in the woods is announced by a peculiar and very intense sort of noise, occasioned by the flight of the heavy and clumsy animal. It is heard from a great distance, and is much louder than the noise produced by a flying pelican or swan. Far-fetched explanations have been given of this phenomenon, but I think it simply produced by a peculiar structure of the wings. Most interesting and curious is the way the hornbills rear their young. They establish their nest in some hollow tree, at a considerable height, where, as soon as the egg is deposited, the female bird is walled in by the male. Only a small aperture is left open, just big enough for the female to thrust her beak through, and be fed by her partner, who flies busily to and fro with dainties. On inquiring into the reason of this singular habit, we

are led to suppose that it is followed to secure the breed from persecution by rapacious climbing mammals. This also explains the horn's shielding the head of the bird like a helmet, and preventing any robber from attacking the female across the hole by striking her with its claws. This hypothesis would appear irreconcilable with the statement of the entire lack of rapacious animals and

Dactylopsila trivirgata. (One-third natural size.)

arboreal mammals in New Guinea, especially if hornbills be limited to New Guinea and the neighbouring districts. As it is, however, *Buceros* is found in the whole of India and on the Malay Islands, where arboreal beasts of prey abound. Here a protection of the clumsy birds and their young must be of the greatest advantage for the preservation of the species. Most probably the family have spread from India to the Papuan region, and have till now conserved their nesting peculiarities, although, under the conditions found in this their new home, the necessity for these is no more obvious.

It is remarkable, however, that the horny helmet is already much less developed in *Buceros plicatus*, the Papuan hornbill, than, for instance, in *Buceros bicornis*, the most familiar Indian representative of the genus.

There was, moreover, no lack of mammals in the splendid forests of this river-side, but with the exception of the cosmopolitan bats and

Distoechurus pinnatus. (About two-thirds natural size.)

rodents, and two boar species which New Guinea boasts in advance of Australia, all of them were marsupials. Very numerous were the flying squirrels, *Petaurus breviceps*, represented on New Guinea by a peculiar Papuan variety. Another animal, *Dactylopsila trivirgata*, may be said to form a link between genuine "flying" marsupials on one side, and Phalangiers and Opossums, which are devoid of a patagium, on the other, for the "wing-membrane" of *Dactylopsila* is quite insufficiently developed compared with that of the genuine *Petaurus*. *Dactylopsila trivirgata* is one of the very few species of marsupials which are found on both sides of Torres Straits.

Apparently there does not even exist any special Papuan variety. It inhabits the trees of the dense forests, and feeds principally on insects and ants, whereas *Petaurus*, though no despiser of insects, eggs, and small birds, prefers vegetable food. A fine *Dactylopsila* was found by us in a hollow tree. Its markings were exactly those of a specimen described by Peters and Doria as *Dactylopsila Albertisi*. Oldfield Thomas, however, who is a foremost authority on marsupial taxonomy, and who has closely inquired into the nature of their various forms, finds this animal so little different from the typical kind that he even denies it the recognition of a variety.

Another pretty little marsupial was caught by one of the aborigines and taken by me to Suau in a living state. It was the small, very prettily marked *Distoechurus pinnatus*, a tree marsupial likewise belonging to the Phalangeridae. I was unable to find out anything definite about its habits, though it proved an excessively vicious and mordacious little creature. Having enclosed it together with several *Petaurus* in a chest, which, by means of some wire-work, we had transformed into a cage, it immediately fell upon its comrades in the most spiteful way, seeming to regard them as the cause of its imprisonment, and bit one of them so badly that it died soon after. Whilst we had no trouble whatever in keeping a whole party of *Petaurus* alive, and almost succeeded in taming them, *Distoechurus*, as proud as any ancient Roman, seemed to prefer death to imprisonment, and perished in a few days as if suffocated by his own viciousness. He tried to bite me in his very last moments, in misinterpretation of my wish to arrange him a soft death-bed of wadding.

As already mentioned, it was not so easy to communicate with Assi, his English vocabulary being limited to less than a dozen words, which he generally employed in quite a wrong sense. Gradually, however, I perceived that he believed me to have planned an excursion of several weeks, to get as far as possible up the river and into the country. This, however, I was not prepared for, being insufficiently equipped and lacking the necessary provisions as well as articles of barter to procure food for myself and my men. Spirits of wine and glass for the preservation of my booty were likewise wanting, and to make matters worse the teacher Vaitupu had been seized by a violent attack of fever on the very first day of our trip. Under the prevailing circumstances there was no securing proper treatment of his disease, and there was but one course left to me, that of taking him home instantly. Perhaps I ought to have done this, and to have subsequently set out for a longer expedition up

the river. I had, however, previously conceived and fixed the plan of extending my journey to the East Cape, and of keeping some time for Milne Bay, which had been described to me as a sort of paradise for the zoologist.

Thus I set out on my journey back to Suau next day, using the long hours spent on the canoe for the preparation of the hornbills, pigeons, and parrots which I had not skinned the day before. A scorching sun burnt down on our canoe, on the platform of which I, half-lying, half-sitting, in short, in a most inconvenient position, attended to this business, fully exposed to the glaring light and heat. Near me lay Vaitupu shaken by fever, and I must own that, under these unfavourable circumstances, my mind was almost impervious to the beauty of the scene around, which I had admired so much on our journey up the Gara. In this manner we rowed till the evening, when at last we reached the mouth of the river.

Here we were welcomed by a fresh breeze from the sea, and by the noise of the surf. Our passage along the shore in the pitchy darkness, and amidst the foaming breakers, was most uncomfortable. Twice our boat was almost filled with water, and only kept from sinking by our men jumping out and drawing it on shore. Of course we on the platform were entirely drenched, partly by the waves washing over us, partly by those beating from beneath through the bamboo platform. The worst part of the affair was that my birds' skins were completely soaked by the briny element, so that the yields of the past days were badly damaged, and in part totally destroyed.

It was eleven at night when we arrived at Suau. Douglas had gone to bed some time, but the missionary's wife was awake, and immediately took charge of her husband, who was in a most deplorable state. Soon, however, she observed my own need of nursing, who, though far from ill, was nearly spent with hunger. So she brought me the remainder of a portly New Guinea pig, that was killed during our absence, and had been almost consumed by Douglas and the *Hekla* crew.

Vaitupu was so much better next day, that we could safely leave him to the care of his amiable mate. I had asked Douglas whether he agreed to our staying and spending the remainder of the time we had fixed for New Guinea in Suau, which seemed particularly advantageous in many ways, but especially with regard to my collections. He, however, wished to go farther eastward, *i.e.* to Samarai, where there was a white settlement, and where he could hope to find a more comfortable abode and some amusement during my zoological expeditions.

So we weighed anchor, and with a soft but favourable breeze reached Samarai, or Dinner Island, on the same evening. This little islet is the seat of government for the eastern third of British New Guinea. It is separated from the continent by no more than a few miles, and belongs to a group of bigger islands, which form the continuation of the south-east extremity of New Guinea. The small strait between them and the continent is called China Strait. On following the archipelago farther in a south-eastern direction we find the islands of the Louisiada group, the two largest of which, Rossel Island and Sudest, must be regarded as the real south-east point of New Guinea. It is probable that during a still remoter period also the New Hebrides were connected with New Guinea by means of the Bismarck Archipelago and the Solomon Islands, whilst New Zealand and New Caledonia were at that time connected by way of the northern Queensland and Torres Straits, then a tract of land.

Samarai is a hilly little island, dominated by the Government buildings. A great drawback, however, exists in a nasty, stagnant swamp, lying just at the foot of the hill on which the Government House is erected; and to this we may attribute the noxiousness of the climate. I tried in vain to discover why the Colonial Government, generally so eminently practical, should have chosen this very place for its seat.

Very few white men were present at Samarai. The upper official was at that time the Hon. M. H. Moreton, private secretary to the Administrator. He had been living in Queensland for a considerable time as a squatter, and knew many of my own acquaintances in those parts. Another official then present at Samarai was Mr. D. Ballantine, the rest were subalterns and a clerk of the firm Burns, Philp, and Co. The missionary station is situated on the continent opposite the island, and was then conducted by a white missionary, Mr. Abel; while a Wesleyan missionary was just staying on the island as a visitor.

The Wesleyans have chosen for their field of action the island groups south-east of New Guinea, including the Entrecasteaux Islands; while the London Missionary Society regard the whole southern coast of the New Guinea continent, from Torres Straits to the East Cape, as their sphere, excepting only the Jule Island district (St. Joseph's River and its surroundings), where the Catholic missionaries, "*Au sacré cœur de Jésus*," exert their influence. In the north-east of British New Guinea we find that Anglican missionaries predominate; they have, however, only just begun their work.

Mr. Moreton was so kind as to offer his hospitality to my friend Douglas for the time I should spend at the East Cape and at Milne Bay in my zoological researches. Thus I left him quite comfortably settled when I continued my journey next morning, hoping to reach the little village of Bou, near the East Cape, that same evening.

As usual, the wind was not favourable, and we had to tack incessantly in the narrow passage between the islands and the continent. Our captain conducted this manœuvre by calling out from time to time, in a very sleepy voice, "bout ship." In the intervals he was occupied in feeding a party of flying squirrels brought to him by the aborigines. He kept them in a chest, nursing them with the utmost care, as he wanted to take them with him to Thursday Island. He had the firm conviction that the aborigines' name for *Petaurus* was "silly-silly," and wherever we landed he used to implore the natives to bring him such. I have, however, not met with a single Papuan tribe who understood this name, and therefore consider it the captain's own ingenious invention. Moreover, it was so strikingly suggestive of the captain's personality that Douglas made it his nickname, and never spoke otherwise of our illustrious pilot than as "Captain Silly-Silly."

While, as has been remarked, this personage was thus employed in feeding his interesting menagerie, I meanwhile sitting on deck, deeply absorbed in the writing of my diary, it suddenly struck me that we were making straight up to one of the reefs bordering the mainland. I jumped to my feet, calling out "bout ship" with all my strength, but, ere my command could be obeyed, the point of the ship struck the side of the reef with considerable force. All efforts to free ourselves were in vain, the water fell, and we had to submit to the inevitable and wait for high water. Thanks to good luck, the day was calm and the sea almost smooth. A stormy breeze and violent waves would have been sure to damage our ship most seriously, if not to dash her to pieces.

I must own that I felt pretty much aggravated by this little disaster, being in fear that the wind might rise and endanger our craft, my collections, and scientific instruments. Personally we were safe, as the reef was in the close vicinity of the mainland. Again, as had been the case on the Hula sandbank, the first high-water tide was too weak to set us free. It retreated without releasing our ship, which once more sank to the side. The thunderstorm and wind, generally setting in at night, held off for once—a most fortunate circumstance—and the strong flood-tide of the following morning lifted our ship and released us from our suspense. Without

any further disaster we, at noon, reached Bou, situated on the north entrance of Milne Bay, just opposite the Killerton Islands.

Mr. Abel, the Samarai missionary, had advised me to choose Bou, principally because the South Sea teacher stationed in that place, Maanaima, a Samoan, was considered by him an unusually clever and handy man, who would be of use to me in many ways. My readers may imagine the disagreeable surprise it gave me to hear that Maanaima was absent from Bou on a visit to another missionary, Filimona, living at Mita. I, however, took the liberty of establishing myself in his house as comfortably as possible, taking my provisions on shore with me, as my captain declared that the ship could not remain at anchor off Bou, but had to be taken some miles farther, where, behind the Killerton Islands, it would find better protection from the powerful south-east winds. Thus I remained all by myself among the inhabitants of Suau, who, for the most part, behaved rather sulkily. Only a few of them approached me in an amicable spirit.

The people of Bou are pretty similar to those of Suau and Samarai, and far smaller and weaker than those of Hula and Aroma. On the whole, however, we find a common type underlying all these varieties of size and colour, a type we may term the "Papuan," in a restricted sense of the word. The hair is worn shorter by these people than by those more to the west, so that we rarely find those splendid manes which are the pride of yonder tribes. The colour of the hair varies between black and auburn, and I even saw some individuals whose hair was almost red. Possibly, however, this was not quite owing to nature, but to some material used for dressing the hair. Their skin may be described as chocolate-coloured, and is just a shade lighter than that of the Samarai and Aroma people.

Of very frequent occurrence is a disease of the skin, apparently a sort of ichthyosis. The epidermis is loosened all over the body, forming little shining scales, which resemble the scales of fish, and give a dull lustre to the skin, instead of that warm and beautiful hue which it possesses in its normal state. Nearly 20 per cent of the populace were found afflicted with this ugly disease; also at Suau it was very common, and I must own that I always felt rather disgusted when brought into closer contact with afflicted individuals, as, for instance, when they formed part of our crew. Besides the loss of personal beauty, and a certain itching which causes those persons to scratch themselves continually, the disease does not seem to be really painful, nor does it endanger the patient seriously. Not one of the Milne Bay aborigines

Plantation near the village of Bou, Milne Bay.

was found to be tattooed, whilst the population of Samarai and the adjacent continents frequently resort to this kind of ornament. Men and adolescents hide their pudenda by strips of bast, which they attach to their waistband and draw up between their legs. The violent compression of the waist by a belt, the fashion farther west, is unknown in this region.

The mountains fall steeply off towards the sea, and are torn by deep ravines. They are covered by a dense vegetation, this south-east extremity of New Guinea being visited by continual rains. A dry period, at times the cause of great calamity at Port Moresby, is quite unknown hereabouts. Plantations of the aborigines cover the mountains almost up to the summit, as, in this densely populated district, the inhabitants are naturally eager to turn to advantage every smallest piece of ground, be it ever so hard of access. The cocoanut tree is very much cultivated, and great quantities of copra are produced. I also received bananas of a delicious flavour, which I had sorely missed in the places I had hitherto visited, only subordinate qualities being cultivated there. Besides, I was furnished with Papaya fruit, not counting the inevitable yams and taro.

I soon made friends with some of the younger natives, and let them accompany me on my expeditions into the almost impenetrable forests which cover the steep descents of the mountains and veil their sharply-cut outline. A little lad of fourteen, of lively temper and quick intelligence, created himself my personal aide-de-camp. He soon grew inseparable from me, accompanying me from morn to night, helping me to preserve my animals, and acting as interpreter between me and his people, though he was just as ignorant of my language as I was of his. He was, however, much quicker at guessing my meaning than any of the others. On the photograph, p. 385, he is the boy who stands farthest to the right (in the view of the spectator). Apparently he and his friends had spread the news of my stay and my special wishes all over Milne Bay, for soon there began a sort of pilgrimage to my abode from all the places on the coast and the villages inland. All these people wanted to see the white stranger and to bring him some little treasure: all sorts of animals—worms, snakes, lizards, beetles and crickets, bats and marsupials. Nowhere did my collections thrive so splendidly as during these halcyon days I spent all by myself on this far extremity of New Guinea. They were a sort of idyll, and will be treasured among the pleasantest remembrances of my journey. Among other interesting specimens I received two fine and rare pythons, *Python amethystinus* and *Chondropython viridis*. The

latter is of a grassy green, a colour rarely found in giant serpents. The middle of its back is marked by a row of small spots of a vivid yellow, the under surface is of a more whitish hue. I also found

Boys and Youths of Bou.

a very pretty frog species, which was new, and has since been described by Professor O. Boettger as *Hyla Semoni*.

The marsupials were generally brought to me alive, among them, besides numerous flying-marsupials, two species of Cuscus, an animal closely related to the Australian opossums, *Trichosurus*, but distinguished from them by the clumsiness of their structure, by the vertical disposition of their eyelids, and by their bare

and warty climbing-tail. While *Trichosurus* is a native of Tasmania and Australia, *Cuscus* spreads over New Guinea, the Bismarck Archipelago, the Solomon Islands, the Moluccas, and Celebes. It is only in Northern Australia that the two genera meet, so that both may be found in Queensland. On travelling from the south to the north of that country, one will, however, find *Trichosurus* become rarer, *Cuscus* more frequent. A third genus, the ring-tailed opossum, *Pseudochirus*, spreads over the whole of Australia and extends over New Guinea, where it is represented by two peculiar species. The habits of life are very similar in these three animals, except that

Phalanger orientalis, var. *typicus*.

Phalanger and *Pseudochirus* cling by their tail to trees and branches ; whilst *Trichosurus* employs it only to keep its balance when climbing, and to steer itself when jumping.

In this place I found two species of *Phalanger*, *Phalanger maculatus* and *orientalis*, var. *typicus*. *Phalanger maculatus* is a species varying very much in hue. Some specimens are gray, some yellowish or nearly white, some are unicoloured, others marked with red, brown, or black spots. Among the animals brought to me alive there was one of which the dense and silky fur was a vivid yellow-brown on the upper side, without a speck or stain, while on the lower side it was snowy-white. It was a male, and of a much more amiable temperament than most of the other *Cuscus* we had captured, which were terribly spiteful and pugnacious, scratching and hissing whenever one approached them. I fed the fine little creature with bananas, and soon tamed it so far that it liked to be stroked and petted, and showed an unmistakable predilection for its master.

I felt quite sad when, shortly before starting from Bou, it was stolen from the verandah of the mission-house by one of the tame dingos kept by the natives, and met a miserable death, torn to pieces by those unsympathetic beasts.

On the fourth day of my presence at Bou, Maanaima returned from Mita in a whale-boat, accompanied by two other Samoan teachers, Filimona and Toma, and by the wife and daughter of the latter. The mission-house at Bou hardly differed from the native houses, possessing like them but two rooms. One of these was left entirely at my disposal, whilst the other served as parlour, dining- and bed-room for the entire missionary party. It was very agreeable for me to find that Maanaima knew English, and was, on the whole, a man of intellect, understanding, and energy, and besides of a most obliging disposition. According to what he told me, he had won ground as yet with very few of the inhabitants of Bou, whilst the greater part regarded him with distrust and animosity, as indeed they did me whenever we chanced to meet. The fact is that a conservative party exists even among these savages, persons who dislike any new fashion, and do not care to be told that it is wrong to kill one's enemies from behind, slay their wives and children, use their skulls for the adornment of their houses, and roast their flesh for Sunday dinner. Almost all the warfare of Papuans consists in secret and sudden invasion, differing most unfavourably from the wars of other savage people by the habit they have of killing women and children as well as men. They regard them as the future avengers, or as mothers of avengers, and do not rest till they have decimated the hostile tribe, so as to exclude all possibility of retaliation. Nevertheless, sooner or later, a similar attack by the chance survivors of the slaughtered party is wont to take place, which, of course, again demands retaliation. Thus we find that this cowardly warfare amongst the aborigines is maintained for any length of time, engendering ceaseless bloodshed and horrors of all kinds; but this, notwithstanding the nature of the Papuan, must by no means be considered as particularly cruel or spiteful.

Maanaima told me, however, that he could mark some vestige of progress during his six months' work. Cannibalism had almost disappeared, and he had induced many of the aborigines to bury the skulls of their slain enemies somewhere near the missionary building, instead of using them, as previously, for ornaments to their houses and as objects of pride and boasting. I expressed my sincere admiration of this honest man's efforts and success, but begged him at the same time to crown his deeds of humanity, and

make the trophies he had removed from the houses accessible to science, by helping me to disinter them and to carry them away. At first he seemed reluctant; but later, he declared himself ready to serve my aims. Thus we two set out one starlit night, like a pair of conspirators, whilst the village around us lay in midnight slumber. This secrecy was unavoidable, as it would decidedly have damaged the authority of the mission had people known that we disinterred the skulls committed to the earth, and that I had been allowed to carry them away with me. A number of Papuan skulls, well preserved, if somewhat blackened by smoke, was the result of our nocturnal treasure-digging. They at present form a most valuable part of my collections.

A curious feature was the absence of all the lower jaws of those skulls, and, wondering what had become of them, I asked Maanaima whether he could not procure them for me. Next day he brought me the jaw depicted on p. 399, Fig. 24. It had been turned into a bracelet by a strip of bast connecting the opposite ends of the bone. Tied to it we see a few empty shells of some nut-like fruit. They are supposed to click like castanets, when the arm which is adorned by the bracelet is moved or shaken. This shows how varied are the profits drawn out of the slain enemy by the Papuan warrior, and in what a poetic manner he knows how to wear the keepsake of a fallen foe. Sometimes one also sees vertebræ of the neck or back worn as headgear.

On Sunday, 8th May, Maanaima tried to celebrate divine service on the place before the mission-house. A most violent rain and storm, however, induced the members of the community to stay away. Filimona had returned to Mita some days before.

The oldest missionary station of Milne Bay is that of Aroani on one of the Killerton Islands. The Polynesian teachers in New Guinea are much disposed to fever, to which South Sea islanders seem to be more exposed than whites, and with the former it more frequently takes a fatal turn. Maanaima had but a short time ago lost his wife by fever, and great is the number of the victims the preaching of the Gospel has cost these its faithful, brown disciples.

After a week's stay at Bou, I took leave of the beautiful bay, in which the richness of the Papuan flora and fauna is accumulated in unparalleled abundance. Maanaima took me on board the *Hekla* in his whale-boat, my aboriginal friends escorting me in their canoes and on raft-like crafts composed of a few tree-trunks tied together a queer contrivance which I never saw elsewhere.

At

time and was remarkably pleased by my return. He brought with him a pair of white cockatoos with yellow tufts, a present made to him by some natives. The Papuan variety is considerably smaller than the Australian, which we so often see in menageries and zoological gardens. Its character is gentler and more amiable, its voice less piercing. Both birds soon became our pets during the long journey back. They made themselves quite at home on board our lugger, climbing about like monkeys, and delighted whenever we took notice of them and fondled their heads or bodies. When the weather was bad, we had to take them down into the dark and stuffy hold, where they immediately grew sad and shy; but as soon as they were once more taken on deck and into the joyous sunlight they became bold and lively. Then they would behave like a couple of merry boys who have escaped the schoolroom. We should have liked to leave them at liberty all day long, had they not been in need of continual superintendence, having the bad habit of attacking everything with their sharp and powerful bills, and of destroying all that was not clinched and riveted in an incredibly brief space of time. On the whole, however, they showed a cleverness and docility found in hardly any other bird, and far excelling that of many domestic mammals, as, for instance, rabbits, guinea-pigs, ruminants, and pigs, and nearly equalling that of the dog. Their talent for speaking was likewise remarkable, and one of them learned to say "Cockatoo" and "pretty Cocky" in no time.

At Samarai, a young trader called Richard Ede came to ask me to be taken to Thursday Island on my lugger, as he wanted to return to England by the steamer *Jumna*. He had been trading for several years on the south and north coast of New Guinea, and had just returned from a long expedition to the Trobriand Islands, where he had suffered severely from malaria. He was still very much pulled down at the time we met him. This man had generally undertaken his excursions accompanied only by some South Sea islanders, and had frequently by a hair's-breadth escaped the fate of being murdered by the aborigines, who were, of course, greedy for his goods. It cannot be denied that, in spite of all their amiable and even charming qualities the Papuans are often very cunning and covetous, and do not mind killing a harmless stranger with whom they hitherto stood on the best terms, as soon as his possessions excite their desire, and their superior force makes it easy for them to surprise and overpower him. The danger

is not so great for him who stays at a place but a short time, as the plans of the aborigines always take a considerable period to ripen.

I was told by Ede that on two occasions he had been warned by native women, who had advised him to depart, as their tribe was preparing an assault against him. A similar incident is told us by d'Albertis, who, at Roro, was put on his guard by Abia, a girl of Bioto, against a secret attack by her own tribe. Thus we see that even among savages the mind of women is averse to murder and bloodshed, and that the wife of the wild and naked Papuan is in a way akin to the noble Grecian Antigone, whose glorious words: "Nicht mitzuhassen, mitzulieben bin ich da," may be regarded as the stamp of the true feminine mind all over the world.

On the 10th of May we weighed anchor and started on our way back. Had the weather been normal, the regular south-east monsoon ought at this season to have set in with considerable force and continuity, and would thus have taken us to Thursday Island in less than a week. At all events, however, we should be back by the 20th, on which day the *Jumna*, which Douglas and Ede wanted to join for their voyage home to England, was due. In this year everything seemed reversed. As long as we steered to the south-east and were in need of a good north-wester, a strong south-easter had blown in our teeth. Now, when in need of the latter, we were met by the most violent and tempestuous north-wester. Then, again, we underwent calms of several days' duration. With sails closely reefed, our good ship *Hekla* endeavoured to meet these contrary winds, but on 14th May, we were no farther than Toulon Island; and three days later, when a short settling down of rain and storm allowed us once more to take our bearings, there we were in exactly the same place as before.

The stay on our little craft, the deck incessantly washed over by the waves and the cabin but a little hole, too bad even for a dog, was most unpleasant, even for people who, like me, were used to roughing it. Besides, I was annoyed by continual disagreements with the captain, who reefed our sails so tightly, even when the wind was moderate, as to hinder us from making any progress whatever, so that our ship kept sticking to the same point with a ridiculous persistency. Worse still were the calms which followed the north-west storms. After a tempest of this sort, and after the wind has settled down completely, the sea continues for a long time to heave slowly up and down. No breath of air moves the sails, and they flap about the masts in an irregular movement, most trying to the nerves. Thus the ship, robbed of all resistance, becomes the

plaything of the sea. She is turned hither and thither, swung up and down by the fluctuating waves, jerked to the right and to the left, and capriciously lifted out of the water, now in front and now behind. The irregularity of these movements it is which makes them so painful to bear, the more so under a scorching sun, which, unalloyed by the slightest breath of wind, blazes down on the unlucky seamen, who have a hard time of it. It is at such times and in such climates that the seafaring man learns to prize the blessed invention of steam.

Slowly and little by little we made our way. On 18th May we saw Constance Island near Aroma, on the 20th we found ourselves becalmed off Port Moresby.

My two companions had by this time given up hope of catching their ship at Thursday Island. It took us two more days to drag ourselves to Yule Island, where we had settled to go on shore for water and firewood. On starting from Thursday Island we had taken two barrels of excellent rain-water for drinking purposes. One of these had been emptied during our journey, the other, meanwhile, had become infested by mosquito larvæ and chrysalid to such an extent, that even a naturalist's mind revolted against this form of "meat-juice." On Yule Island we were welcomed by our old friends the Catholic missionaries, with whom we took a ride to the two native villages on some half-wild horses belonging to the mission. The saddles and bridles of these animals did not seem to consist of leather, but of tinder, a circumstance which did not enhance the pleasure of our ride.

Here I had made my first acquaintance with the Papuans, and here it was that I took leave of them. In the account of my journey from Yule Island to the East Cape, I have frequently had occasion to comment on the bodily and mental qualities, the customs and habits of this unique race, and it is but fitting that at this point of my narrative I should try to give a concentrated description of the ethnographical and anthropological results of my observations, as I have done this previously in reference to the aborigines of Australia. Considering, however, the passing character of my intercourse with the Papuans, and the doubt, insufficiency, and ambiguity as yet characterising most of the studies of this race, my courage fails me, and I will only give a slight sketch of what I observed without making any claims to a definite and final statement.

New Guinea is inhabited by a dark-skinned, woolly-haired race termed Papuans (*orang Papúa*) by their north-western neighbours, the Malays. Tribes very much resembling the inhabitants of the main island are met with, not only on the islands within the

neighbourhood of New Guinea, the Kei and Aru Islands, Mysol, Salawatti, and Waigiú, but spread over the Bismarck Archipelago, the Solomon Islands, and New Hebrides as far as Fiji, and even New Caledonia, where, however, the mixture of strange elements is obvious. The entire range of the above-mentioned islands being commonly termed Melanesia, one begins to call the race inhabiting this wide district Melanesian, reserving the term Papuan for the inhabitants of the main island of New Guinea and its nearest satellites. Some writers even go so far as to divide the population of New Guinea into a Papuan and a Melanesian element. As, however, the close relationship between the population of this entire range cannot for a moment be doubted, it becomes necessary to decide upon a common name for the whole assemblage of races, unheeding their more special groups and varieties. I, therefore, use the term Papuan in this general sense. Beside it there exists another group of likewise dark-skinned, yet more curly- than woolly-haired people, consisting of the inhabitants of the mountainous districts of the Philippines and of the more woolly-haired Semangs of Malacca, two branch-races, often collectively termed Negritos. As closely related to them we may regard the Mincopie race, whose typical representatives are the inhabitants of the Andamans. Whether, however, there is any close relation between Papuans and Negritos is a difficult and yet unsolved question. Quite as doubtful is the position of the dark-skinned and curly Alfures, the aboriginal inhabitants of some of the larger Moluccas, the islands of Ceram, Buru, and Halmahera. Still it appears as if these had assimilated many Papuan elements.

Putting aside these and other smaller groups we find the Papuans surrounded by the following races: to the west by Malays, to the south by Australians, to the east and to the north by Polynesians, consequently by three main human races, from each of whom they differ in a very striking way. Having myself become acquainted exclusively with the New Guinea Papuans, the following must be regarded as referring exclusively to them, without extension to the rest of the Melanesian Islands.

As is generally known, New Guinea, next to Greenland, is the largest island of the world, far exceeding in size the German Empire. Although many hundreds of miles of the New Guinea coast are known to me, this is yet a minimal part compared with the entire island, and all I have observed must, consequently, be regarded as strictly relating to the south-east of the island. Narratives and pictures of other travellers have convinced me that the ethnography

and anthropology of the Papuan people are complex, presenting a number of local variations and characteristics. Still it seems to me that we have before us a relatively uniform race, which forms an undivided totality, in spite of the various influences exerted upon it by its nearer and remoter neighbours.

As to the bodily peculiarities of Papuans, I have described them on p. 313, while at different points of my narrative I have referred to the considerable differences in the size and colouring of the various tribes between the Gulf of Papua and the East Cape. Striking as these differences are, I had never the impression of their being the marks of different races. They rather appeared as varieties of one well-defined type, which was distinctly discernible in their physiognomy, cranial structure, and general build. It is true that the eastern extremity of New Guinea shows a stronger intermixture with Polynesian elements than the districts farther westward. This same influence, I was told, is discernible in the dialect. Still the true Papuan element is so predominant, even at the East Cape and at Milne Bay, that there is no need of excluding the tribes of those parts from a discussion of these matters.

I hope that my readers, after having perused the account of my stay on and off New Guinea, have formed a tolerably vivid impression of the character of the Papuan people, of their lively, impulsive, and harmless ways, of their gay and buoyant temperament, the ingenuous manner in which they give way to their moods and sentiments, and their homely tendencies, which are expressed in their kind treatment of wife and child, and in their sincere mourning for a deceased relative. The Papuan is of an impulsive nature, and this very impulsiveness engenders also the dark sides of his character: his covetousness of beautiful things seen in the hands of a stranger, the unreliability shown towards many, but by no means all, foreigners, the reckless cruelty of his warfare, and the passionate outburst and quick appeasement of his anger.

No Papuan is a good and persevering worker, a serious view of life being a thing entirely unknown to this sunny and childlike race. The existence they lead in their beautiful home seems something of a play, their mind is given entirely to the present and its grief or pleasure, and their first object is the free and easy enjoyment of life. Even where they are wont, like the Motu, to undertake long and somewhat dangerous sails, they know how to interrupt this busy time with gay festivals and months of leisure, and to give the whole rather the character of a pleasure trip than of a serious commercial undertaking.

Their social order is of the freest. Chiefs, as far as any such exist, exercise an influence on the actions of the tribe only with regard to foreign affairs. Every one is his own master, and at leisure to do anything he likes at home. Even the children enjoy a perfect freedom. The women take care of the house, and manufacture pottery in districts productive of suitable clay, and work in the plantations. But never is their work a hard one, all is done *con amore*, and considered rather an agreeable pastime than a serious duty. The men are fishermen, huntsmen, and sailors. But the fishing is only done if the weather be fine, and the hunt is exercised rather as a sport than as a means of procuring the necessities of life, as is the case with the Australian natives. It must be remarked that Papuans are chiefly a coast population, and that, only where there are rivers, we find them entering farther into the country, along the course of the streams. Immense ranges of the mountainous interior of New Guinea are wholly unpopulated, a circumstance which renders it very difficult for the explorer to penetrate deeper into the country. This, and the rugged and otherwise impenetrable nature of the mountainous districts, appear to be the chief reasons why hitherto all efforts to cross the main body of the island and inquire into its character have proved vain. As one cannot expect to come upon aborigines, from whom one might obtain food, one would have to engage a great number of bearers to carry the provisions wanted on so extensive a journey. Portage is a kind of work decidedly unsympathetic to the Papuan, who would make a bearer alike unwilling and incapable, being able only to carry less than the half of a negro's usual burden.

The inhabitants of the denser-populated British south-east New Guinea seem to be throughout more energetic and valiant than those of the Dutch and German districts on the northern coast, though brave and courageous warriors are just as rare here as they are anywhere else. Their warfare chiefly consists of cowardly assault. The fights themselves are non-sanguinary affairs, bloody only is the pursuit of the flying or the slaying of the defenceless enemy taken by surprise, or the mean massacre of helpless women and children. Chalmers, however, in his interesting communications about the tribal wars of the Papuans, has given some examples of brave and determined men, who did not spare their own life where it might serve to rescue a friend in need—heroes, like Valina Kina of Kalo, who boldly braved manifold dangers.

Concerning the Papuans' intellect opinions differ very widely. To me their intellectual standard appears by no means low, and

far surpassing that of the Australian, though decidedly inferior to that of the Negro race. In comparing it with the latter we must, however, be conscious of applying a very high standard. For, though the level of the Negroes' civilisation is almost throughout a low one, their faculties are so considerable that, as shown by many instances in North America, they are apt in nearly every respect to rival the Caucasians. But few races of the world can vie with them. On comparing the Papuans with their northern and eastern neighbours, the Malays and Polynesians, we find that Wallace, who spent eight years in the Malay Archipelago, and is one of the ablest and cleverest observers, judges them to be perfectly equal, if not superior, in intellect to the Malays. This supposition seems to me somewhat too favourable, as the white missionaries, who have ample opportunities of forming a judgment as to the intellect of their pupils, declare the faculties of their Papuan pupils as by no means unusual, and decidedly inferior to those of their Polynesian school-fellows.

It is difficult to give a final opinion about the religion and worship of the Papuans, for in these matters there is a great difference between the single tribes and our knowledge, much too insufficient in every direction to enable us to discern the important from the unimportant traits. So much, however, is certain: their inward life is still very undeveloped, and religion plays a decidedly inferior part in their interests. Their mourning customs, which are very severe, are strictly observed. In many parts of the island wooden images of their ancestors seem to receive a sort of worship; not, however, in the south-east corner visited by me.

All along the Gulf of Papua we find mighty temple buildings, the "Elamos" dedicated to two gods named Semese and Hovaki. No woman or child is allowed to enter them. Somewhat of the same order are the "Mareas" on the St. Joseph's River. Still farther to the east we see the temple building disappear, and there only remains the sacred *platform* adjoining it, which seems to possess a general sort of "holiness," without being dedicated to one particular god. On the whole, it seems as if those south-eastern tribes lacked every belief in a supernatural being. They indeed possess a number of superstitious customs, execute certain ceremonies in case of bereavement, during the absence of their relatives on dangerous expeditions, or whenever it rains too little or too much. These practices, however, bear rather the character of magic rites than of religious worship. The Papuans live in great fear of sorcerers, be they single individuals or whole tribes. They try in every way to

propitiate those whom they believe possessed of witchcraft. Sickness, above all lunacy, is regarded as bewitchment. Their ancestor-worship, however, shows us that they believe in an existence after death. But all these ideas and beliefs are so indefinite, confused, and fluctuating, that we can regard them but as the *beginnings* of a religion. A far minuter knowledge than we possess at the present moment is necessary before we can make any generalisation, or undertake to enter into a comparison with the religions and worship of the neighbouring races.

Papuans are polygamists, and their wedlock is a loose one. It often happens that a man sends away his wife or separates from her in friendship, dissolving their marriage without much ceremony and as easily as it had been entered upon. There is no vestige of the complex marriage laws, and the prohibitions of intermarriage between near or remote relations, which we find in Australia. The initiation of the grown-up adolescents is celebrated here and there, as, for instance, on the Gulf of Papua. It does not, however, bear the same solemn character as the similar Australian ceremonies, and it is probable that the custom has been introduced into those districts from Australia by way of the Torres Strait islands. In the same parts we also find singular ceremonial dances, for which fantastically shaped masks are in use, a custom quite unknown to the more eastern tribes. These dances are only participated in by the grown-up and initiated men and adolescents.

The tribes of the Gulf of Papua are particularly interesting, as they have been less exposed to Polynesian influences than those living farther to the east. We must not, however, forget that a certain, though decidedly not very efficacious, influence may have been exercised on them from the Australian continent.

It is natural that a people like the Papuans, gifted with a considerable imagination, should possess numerous myths, generally narrating in a poetic form the history of the tribe, its wanderings, and the progress of its culture. Poetry, song, and music are not, however, the strong features of our friends. The main gift nature has accorded to their minds is their artistic sense, which ranks them foremost in the line of artisans.

Though it is obvious that a people standing on so low a level of general culture as the Papuans, can in no way be measured as to artistic productions against Europeans, still I dare to maintain that the love of artistic ornament is deeper and more general in these poor savages than in ourselves.

How poorly developed is that sense in the lower, yes, even in the

Weapons and Implements from South-East New Guinea. (The articles marked with an asterisk come from the Trobriand Islands.)

Figs. 1-3. Wooden clubs ; 4. Club with stone head ; 5. Battle-shield ; 6. Dancing-shield ; 7. Drums ; 8-11. Tobacco-pipes of bamboo ;
12. Basket with others fitting in ; 13. 14. Women's frocks ; 15-17. Calabashes ; 18-20. Stone axes, and handles for the same ,
21. Figure-head of a canoe

middle classes of most European nations! Would our fishermen think of giving their oars an elegant form, or of decorating them by some design? Would a European ploughman ever demand anything else from his plough and axe than that they should be solid and practical and serve his purposes? Would he strive to give these things a handsome shape, although he has to do with them day by day and year by year? And are we, the "refined" classes, much better than they? Artistic sense is, with most of us, an at best artificially-acquired virtue, a quality ingrafted on our original self. We read thick volumes about the "History of Art," we contemplate pictures and statues, and feel a certain pleasure in "going into" art on occasion of a journey to Italy. The more zealous among us take an artistic paper, or alas! adorn our homes with all sorts of factory-made articles—glass paintings, plaster statuettes, and the like. Rarely enough do we find the personal taste of the possessor expressed in these things, which are generally fit rather to spoil and mislead the taste than to develop it.

But little as this is, is not even *it* rather acquired by habit and by the spirit of imitation than the outcome of an inward want? Do not hundreds and thousands of us take up the pen day by day without giving a thought to its plain or ugly shape, without once conceiving the wish to supplant it by a more elegant specimen, inexpensive as such an article would be? And is not this the case with a multitude of other things? The richer among us permit ourselves the luxury of silver and ivory combs and brushes, and even go so far as to decorate them by a monogram! But where do we find an attempt to give these articles of daily use a graceful and elegant shape, which would be a nobler aim than the mere ordinary pleasure in the value of the material? The same may be said of the knives, forks, and spoons which we take into our hands day by day without heeding the absence of really artistic workmanship. If, on the contrary, you enter the museum at Naples, and examine the implements of everyday life used by the ancient Pompeians, as, for instance, the various and graceful designs of even their sieves and other kitchen utensils, you will at once own the superiority of this ancient people to our modern nations and their pre-eminence in matters of taste and artistic sense (not to speak of the Greek, whose love of beauty is unequalled and above all comparison). Then you will coincide in my opinion, viz. that the appreciation of the beautiful form has remarkably decreased in the Europeans of the present day, as compared with the nations of the olden times and with the poor and naked savages of New Guinea.

Implements and Ornaments from South-East New Guinea. (The articles marked with an asterisk come from the Trobriand Islands.)

Figs. 1-16, Wooden knives used for betel-chewing ; 17-19, Knives of cassowary-bones ; 20-29, Necklaces and bracelets (20-23, 25, 26, of cone shells, 27, of dogs' teeth ; 28-29, 31, of plaited work, 24, male under-jaw as armlet), 30, Plaited finger-ring ; 32, 33, Vessels for lime-water, 35, 36, Wooden cups for bruising betel, 34, Shell as brow-ornament, 37, Bamboo knife for wrenching off heads ; 38, Shell-money, 39, 40, Combs ; 41-44, Head-dress of birds feathers (41, parrot feathers, 42, 44, bird-of-paradise feathers ; 43, cassowary feathers and marsupial's tail).

In general, their civilisation is on a level corresponding to the more recent Stone or Neolithic Period of Europe. All their instruments consist of wood, stone, shell, and bone. They are ignorant of the gain and working of any kind of metal. Still they stand far above the Australians, for all their instruments and weapons are carefully worked, their stone axes beautifully polished, and they know how to cook their food in pots of their own invention and making. On further examination of their primitive tools of wood, shell, or stone, their bowls and cups of pumpkin or cocoanut, we find a victorious artistic sense pervading them all, and see that there is not a single one which does not bear testimony by some little design or ornament to the good taste of its maker, not an article which does not show some trifling accessories surpassing mere utility, and present in it solely for beauty's sake. I have on pp. 397, 399 portrayed a number of the Papuan instruments and weapons brought back by me, trying thereby to give the reader an idea of what I mean by the above remarks. I am sorry to say that the photographs of these articles do not do full honour to the originals, but give only a weak idea of their elegance and beauty.

What excites our admiration most of all is the variety and diversity of the patterns, a proof of great power of imagination in this primitive race. On p. 399, Figs. 20-26, we see bracelets made out of the shell of *Conus miliaris*, an ornament very much in favour. Fig. 25 represents a number of narrow arm-rings made of *Trochilus*, Fig. 23, many small shells arranged as a wreath. In Figs. 28, 29 the bracelet consists of a gracefully-twisted ribbon of straw. In Fig. 26 a similar bracelet is adorned with rows of little shells. Fig. 24 finally shows the lower jaw of an enemy worked into a bracelet. The same variety may be observed concerning necklaces (Figs. 20, 27, 31). This one consists of shells, that of dogs' teeth, a third of plaited straw. Page 349 shows us another handsome neck-ornament consisting of a piece of mother-of-pearl cut in the shape of a crescent. Figs. 1-16, p. 399, are wooden knives used for betel-chewing. They are dipped into a small bowl, which contains liquid chalk, and are from time to time introduced into the mouth. At once surprised by the variety of these knives and the abundance of different patterns, I became, on closer examination, charmed by the elegance of each separate design, the invention of which would do honour to any European artist (see Figs. 1, 2, 6, 11, 12). Wood-carving must be regarded as the chief talent of the Papuan, the wooden knives just mentioned, the clubs on p. 397, Figs. 1, 2, 3, and particularly the dancing-shield (Fig. 6) and the

canoe-head (Fig. 21) being perfect marvels of that art. If a material does not lend itself to carving, the patterns and figures are burnt into its surface, as is seen in the tobacco-pipes of bamboo (Figs. 8, 9, 10, 11), and in the calabash articles (Figs. 15, 16, 17). Not only wood, however, is carved, but pretty designs are also cut into shells and stone. Thus the stone heads of the clubs are sometimes so masked by their elaborate workmanship as to appear objects of luxury instead of weapons. Fig. 4 (p. 397) represents one of these clubs, though a very plain specimen, as the more handsome ones are greatly prized and were not to be obtained in return for the European knives and axes offered by me.

Objects even as modestly decorated as the oars on p. 402 or the handles of the stone axes (p. 397, Figs. 19, 20) call forth our admiration by the grace and elegance of their shape. Quite marvellous, however, is the abundance of different patterns which we remark on scanning these things more closely. To illustrate this, I represent a few of the designs found on bamboo tobacco-pipes. A somewhat greater uniformity is shown by the calabashes (p. 403). In each set, consisting of four bottles, we see the same ornament, treated, however, in a somewhat different way on each. It is very remarkable with what skill and exactness the Papuans, ignorant as they are of ruler and compasses, know how to solve the difficult problem of covering a round bottle in so even and symmetrical a manner with the most elaborate and complex arabesques. Another and more simple style of decoration may be seen in the vessel on p. 404, which consists of a coconut ornamented by a plain but pretty intaglio design.

In connection with their eminent sense of form, the Papuans possess an equal taste and pleasure in colour. It would need coloured illustrations to convey an idea of the exquisite elegance and taste with which the Papuan knows how to adapt the feathers of the paradise bird, coloured parrot, and cassowary, as also the tails of marsupials, to all sorts of headgear, in the form of diadems or tufts, besides using them for the decoration of his tools and weapons. The illustrations of p. 399, Figs. 37, 39-44, are far too indistinct to do justice to the originals. The frocks of the women, consisting of grass, reeds, or coconut fibres, are generally prettily dyed in different coloured stripes (p. 397, Fig. 14). The war-shield (Fig. 5) is very tastefully painted in white, black, and red. These examples may suffice to prove the justness of my declaration that the Papuans are true artists. And what is more, their taste seems to run more nearly parallel with that of the civilised nations in its

averseness to the grotesque in form and flagrant in colour than that of many other Oriental races of a culture superior to that of the Papuan. Even the form of the matted lakatoi sails, far from disproving this statement, appears to me far more bold and beautiful than grotesque.

Although a traveller who extends his wanderings over wide and far-separated parts of the island will find local differences in the nature and form of tools and weapons, he will be much more struck by the inner conformity of Papuan productions. A rich collection of ethnographical objects from the north-western coast of New Guinea being submitted for my examination during my stay at Ternâte, I was surprised to note an accordance between them and those I had myself seen and collected on the south-east coast. A similar conformity is found on perusing Finsch's ethnographical work, which chiefly refers to North-east New Guinea.

In how far the Papuans of New Guinea represent an anthropological and ethnographical unity, and how much of their bodily structure, language, customs, and religion must be attributed to the influence of races brought into contact with them, is as yet an open question. Yet it is one worthy of interest, and which it will be a grateful task for the naturalist of the future to bring

Oars.



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Branded Patterns on Bamboo Tobacco-pipes.

nearer a solution, without letting his courage sink in the face of incidents like the tragic fate of poor Ehlers, the last champion among the explorers of this wonderful land.

Who are the Papuans? Where do they come from? Are they

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Branded Patterns on Calabashes.

akin to any other known races? This interesting problem is likewise far from being solved. Leaving aside the question of a possible relation between them and the small race of the Negritos, we can say with absolute certainty that they are in no way related either to the Malays or to the Australians.

More difficult to decide is the question of their relation to Polynesians. It is certain that this mesocephalic, or, in some representatives, even brachycephalic, race, whose skin is, in general, much lighter, and hair is of a less woolly character, present an appearance very different to that of the Papuan. In the south-east of the island, however, we find a strong admixture of the language with Polynesian words, a circumstance denoting a considerable Polynesian immigration into these quarters. But putting aside this admixture by immigration, which is of secondary importance, a relation between Papuans and Polynesians cannot be absolutely denied. I do not, indeed, go so far as Zoeller, who says: "I must not leave unmentioned that I have been unable to find a very striking bodily difference between the brown Polynesians and the likewise brown Papuans of New Guinea. I have, by way of drawing a parallel between the two, frequently put some naked Samoans next to naked Papuans without being able to note any difference between them." So far Zoeller.

Coconut vessel with intaglio design.

I myself have often seen Polynesian teachers among their Papuan parishioners, when I was struck by the obvious difference between them. But even if farther investigations into the anthropological, ethnographical, and linguistic aspects of the matter were to prove a closer relationship to exist between Polynesians and Papuans, this would not solve the problem. It would only show Polynesians to be a branch of the Papuan race, which, by admixture with other races, principally Malays, and by a subsequent independent development, has become transformed into what one may call a new type. The isolation of the Papuan race among the surrounding types remains the same, whether the Polynesian group be an outgrowth of it or not; and, even in the former case, intermixture of the Polynesian branch with other elements and local separation must have created a very considerable disparity between the two.

One thing appears to me certain and above all doubt, that the Papuan race itself is by no means the product of intermixture between the various other races of those regions. To my mind there exist only these two possibilities: either the Papuan race is one of the

independent main types of humanity, to be co-ordinated with the other great and acknowledged races of the world,—supposing which it would be useless to pursue its origin farther back,—or there exists in fact a relation between the dolichocephalic, dark-skinned, and woolly-haired races of Africa and these children of the Pacific, not a *relation* and not a mere *likeness* between Negroes and Papuans. It was none other than Huxley who first drew our attention to such a possibility ; and while a considerable bodily likeness, and many traits in the character and temperament of the two races appear to support this theory, we on the other hand possess no single ethnographical fact which certainly points to it, nor is there any vestige of similarity between the Negro and the Papuan language.

Thus we must resign ourselves for the present, and place a big mark of interrogation at the end of these anthropological deductions. Indeed, it seems to me as if anthropology were condemned to this sort of resignation concerning most of its final questions, since there is hardly another science so tied in its leading-strings, which offers us such fragmentary and insufficient material, the methods of which are so unsettled, vague, and unreliable. The solution of these problems demands, it is true, investigators of almost superhuman qualities. They must be, at the same time, anthropologists, *i.e.* naturalists, ethnographers, and linguists, and travellers who have studied the races they attempt to describe in their own homes and during a long course of personal acquaintance, instead of only from books, museums, and hearsay.

A genius, able to unite in himself the knowledge up to the present scattered in the different and disconnected sciences of anthropology, ethnography, and comparative philology, and who could combine them in one great unity, thus creating a scientific anthropology, in the best sense of the word—such a genius is as yet wanting to the nineteenth century, numerous as have been the excellent and conscientious collectors and investigators in each of the above-named branches. Great as is the progress in the single departments, a connecting link between the scientific results in all the above-mentioned sciences is sorely wanting. This want, moreover, is the reason that so few well-educated men are as yet interested in these matters, although they, more than most others, concern the very foundations of natural and historical knowledge. Much too little of these things is taught in our schools, although they would serve to make the geography lessons, often so dry and tedious, a source of liveliest interest. In our universities, anthropology and ethnography receive only secondary consideration, and indeed in

some professorial chairs for these subjects are yet wanting. But how can this be otherwise, so long as anthropology is so undeveloped and fragmentary, and so unfit to take rank with her sister-sciences?

On getting ready to leave Yule Island on the afternoon of 22nd May we saw approaching us from the shore a canoe with some aborigines. They brought me two cassowary eggs, containing pretty far-developed young. The eggs resemble those of the closely-related emu, from which they differ by their light-green colour. I never succeeded in getting a view of the bird itself, as, contrary to the emu, it is shy and wary, avoiding the lighter woods and open plains, in preference for the dense impenetrable forests. Its tracks, however, I saw often enough. It is ardently pursued by the aborigines, who make of its hair-like feathers a head-dress, and use its tibia for all sorts of tools, daggers, and knives, etc. (as depicted on p. 399, Figs. 18, 19, 43).

An hour before sunset we weighed anchor. At last the stubborn south-east wind was with us, and filled our sails with its powerful breath, which drove our good ship over the waves like an arrow. On the morning of 25th May we passed Bramble Cay, anchoring that evening off Marsden Island; and at 7 P.M. on the 26th May we once more greeted the Thursday Island shores.

So ended our trip to New Guinea, which, though limited as to time, had yielded me many a treasure for my collections, and filled my mind with a profusion of new impressions and ideas.

CHAPTER XV

JAVA

THE next five months were spent by me in Australia, and have been previously described. As aforesaid, I divided my time between the Burnett and the environs of Cooktown, where my stay, however, was of short duration. On 5th November I once more approached Thursday Island, on board the handsome steamer *Wodonga*, of the British India Steam Navigation Company. This time, however, my stay was but a short one, and, after having shaken hands with the old friends, I had to continue my voyage to the west on the evening of our arrival. Our ship was bound for England, touching Java and Ceylon on her way. Her first-class passengers consisted of several Australians going to pay a visit to the old country after an absence of many years. Besides there was an English family, which had come to Australia for a short stay, and a young Englishman, who went in for travelling as for any other sport, returning from his trip to the South Sea Islands, New Zealand, and Australia with an equanimity of mind, as if it had been a mere day's outing. Once the reserve and reticence common to the Britain of good breeding in the presence of strangers, was cast off, our party grew quite gay and friendly, and we soon felt like one big family. We took our meals in the merriest of humours, the honest and amiable captain, Sanders, taking the head of the table. We chatted or were silent, ate and drank, laughed and smoked, and formed the most jolly little party that ever met on board ship. Our evenings were spent at whist, and a part of each day was devoted to cricket.

Those of my readers who have not had the occasion of making a long sea-voyage will, perhaps, be surprised at our indulging in this fine sport on board ship. Our captain, however, who welcomed anything which might enhance his passengers' welfare, yielded us a great part of the upper deck amidships for the purpose. To prevent the balls from flying overboard, this portion of the deck was

surrounded by nets. Still it daily happened that one or two balls fell a victim to the waves, wherefore one of the sailors was continually occupied in manufacturing new ones. I, quite a beginner in this game and by no means a useful acquisition to my side, was always kindly urged to join in, and I soon became as eager as the rest.

We did not even desist from our sport on entering the tropics and approaching the equator. The Englishman is so used to his competitive games, which form a vital part of his education, that his zeal for a favourite sport is not even cooled, or, I should rather say, burnt up by the sun of the tropics, though it demands a far greater amount of energy to set about an occupation of this kind under the relentless glare of that blazing orb, than under the mild rays of a German or English midsummer sun. Not only in Australia, glowingly warm as it may become even there, but in the very hottest towns of the universe, at Singapore, Bombay, and Calcutta, you will find the English colony at their brisk and invigorating games, at tennis, cricket, and football, to my belief a most beneficent custom. The tropical heat, if endured for a long time, will always exercise a relaxing influence on the body of the European. His bodily and, in many cases, his intellectual energy likewise will begin to fail. A tendency towards Oriental languor and a sybaritic life begins to assert itself, which it is hard to battle against. Still it is very important to keep up against this influence, and to take some sound exercise day by day. This, however, is easier said than done, and a thousand wise doctrines will fail to do the service rendered by the aforesaid national pastimes, which, inciting our love of pleasure and competition, attack the human mind from its weakest side. Thus sport of any sort appears to me as a hygienic expedient of the utmost value.

I am far from being a sworn admirer of foreign habits, and there is nothing less to my taste than a blind mimicry of them. Where, however, the advantages of a foreign custom are obvious, I would deem it childish to refrain from accepting, or even from a downright copying the same, only because it is foreign. Therefore I gladly welcome the efforts now being made by many Germans to introduce British competitive games into our juvenile circles, without thereby neglecting our old German speciality, gymnastics. One has, of course, to exercise and grow fond of those games from youth up, if he is to preserve the energy necessary to devote time and strength to them, in spite of difficulties. They claim a victim here and there, for among a thousand youths exercising them moderately and to advantage there will always be a few who allow them to

predominate, forgetting and neglecting higher interests for their sake. This, however, may be the case with almost any good thing on earth, and wherever there is light, the shade will not be wanting.

From Torres Straits we steered to the north-west, passing Babber Island, and entered the Banda Sea on leaving Timor Laüt (Tenimber) to our north-east. After this we sailed along the so-called small Malay Islands, then north of the north-east coast of Timor, whereon we passed between this large island and the little islets of Kisser, Wetter, and Kambing. The north-eastern half of Timor and the island of Kambing are the last remnants of Portuguese greatness in these quarters. The rest of the small Malay Islands are Dutch dominions. Java, Sumatra, Celebes, and Borneo (excepting its northern extremity) stand under the Dutch government, too; whereas the realm of Saráwak on Borneo, founded by Rajah Brooke, has submitted to the British protectorate. The Moluccas and the whole western half of New Guinea likewise belong to the Dutch, whose authority, however, in many parts of the archipelago, as in the interior of Celebes and the south-west of New Guinea, is rather nominal than actual.

A glance at the map shows that the small Malay Islands form an immediate continuation of Java to the east, the islands of Wetter, Alor, Lomblem, Flores, Sumbawa, Lombok, and Bali, appearing but as parts of Java separated from the main island by mere narrow bands of water. The breadth of these channels rarely amounts to more than 30 or 40 miles. Similar to the chain of volcanoes, running like a backbone from west to east through the whole of Java, each of these little islands has a volcanic peak as a centre, or a chain of such peaks as a backbone. Thus our ship closely approached the small islet of Sangeang, the "fire-mount" of which occasioned a most destructive explosion in 1820. Still higher is the volcano of Tambora on the island Sumbawa, and to see the twin volcanoes of Lombok and Bali (4200 and 3200 feet high) lift their forest-covered heads into the clouds amid the glow of the rising sun is a truly glorious sight. On 11th November our ship anchored for a short time off the dangerous road of Buleleng on the north coast of Bali, where she had to land a passenger.

The island of Lombok had but a short time ago gained a sort of celebrity by a rebellion of the natives against the Dutch Government, and by their treacherous assault on and defeat of a detachment of the Dutch army. It was with considerable difficulty that the Government succeeded in overcoming the rising.

There is, however, another kind of celebrity, which marks out Lombok as well as Bali in the eyes of naturalists, viz. the descriptions given us by the great English explorer Wallace, and the ideas he unfolded concerning the fauna of these islands.

I have in various passages of this book called attention to the immense difference between the fauna of Australia with the neighbouring islands and that of the rest of the earth. Wallace, whom we may regard as the founder of a scientific zoo-geography, divides, with Sclater, our earth into six zoo-geographical regions, and with two of these this book has especially to deal, viz. the *Oriental* one, comprising Western India and Indo-China, a part of Southern China, Formosa, and the Philippines, Sumatra, Borneo, and Java, including Bali; and the *Australian* region, the central point of which is formed by that continent. The Australian region is, moreover, divided by Wallace into several sub-regions, the Continental, the Austra-Malayan (consisting of New Guinea, the Moluccas, Celebes, and the small Malay Isles, with the exception of Bali), the Polynesian, and the New Zealand. A survey of the map shows us that, according to this arrangement, a line drawn between Bali and Lombok, and northward past the west coast of Celebes, divides the Malay Archipelago into an Oriental and an Australian zoological province. This line is famous under the name of "Wallace's Line."

It is most striking that this line should run between two islands situated so close to each other as Bali and Lombok. Wallace describes the character of their fauna in these words: "The great contrast between the two divisions of the Archipelago is nowhere so abruptly exhibited as on passing from the island of Bali to that of Lombok, where the two regions are in closest proximity. In Bali we have barbets, fruit-thrushes, and woodpeckers; on passing over to Lombok these are seen no more, but we have abundance of cockatoos, honey-suckers, and brush-turkeys, which are equally unknown in Bali or any island farther west. The strait is here 15 miles wide, so that we may pass in two hours from one great division of the earth to another, differing as essentially in their animal life as Europe does from America."

It is clear that on dividing the world into zoo-geographical provinces, the fixing of boundary lines will be rendered far more difficult in some regions than in others. Thus, for instance, the two American regions, the Nearctic and the Neotropic, are, excepting only the polar regions of North America, very clearly distinct from the four others, offering some slight difficulty only in their division from each other.

Now it is evident that the boundary-line of the Australian region to the south, north, and east, will be easy to draw, whereas serious difficulties arise in the west and north-west, where the Malay Archipelago brings the Australian and Oriental regions into such close proximity, that we may at the outset suspect a zone populated by a mixture of the faunas of both. The determination of a dividing-line through such a zone must necessarily be a difficult matter, and to a certain degree a matter of personal opinion of the investigator.

It is one of Wallace's chief and most eminent merits to have proved beyond doubt, by his manifold observations and ingenious deductions, the necessity of dividing the Malay Archipelago into an Australian and an Oriental part, a division already suggested by George Windsor Earl. Wallace's book, *The Malay Archipelago*, in which he substantiates this, revealing the natural beauties of that wonderful world to the reader, whom he allows to accompany him on his eight years' wanderings, appears to me the most beautiful and interesting work of travel ever written. I even go so far as to set it above Darwin's splendid *Journal of a Naturalist*, because it treats of a smaller region with a minuteness and devotion such as alone are apt to awaken the deeper interest of a reader who is no professional naturalist. The red thread pervading the whole, with all its abundance of detail, of descriptions, and observations, is the question of the present state of that island-world as to its geological structure, its animal, vegetable, and human life, and what has been its historical development. This gives the whole work a concentrated interest unknown to me in any other book of travel.

With this divergence, which, I confess, has partly been prompted by my personal admiration for Darwin's great collaborator, I would direct attention once again to Wallace's "line." Beyond the citation from Wallace's book which I have already made, I refrain from entering into the reasons which caused him to draw the line between Bali and Lombok. I will only ask: How does Wallace explain the, in his opinion, so striking difference in the faunas of both islands? The idea of Lombok having formerly been the West cape of a great Australian, Bali the East cape of a corresponding Indian continent, the two forming a pair of good neighbours, separated only by a narrow strip of water, as Africa and Asia are by the straits of Bab el Mandeb, must be absolutely discarded. Had so close a relationship existed, even for a short space of time, between the two continents, in a period not too remote, the singular character of the Australian fauna would be quite inexplicable.

In the opinion of Wallace, at the time when Timor, the largest island of the group, became populated with the species and genera resembling those of the present day, matters were as follows. Bali, Lombok, and Sumbawa were probably not yet existent, or at the utmost they formed small volcanic cones rising immediately out of the sea. An interval of 300 English miles of open sea thus separated Flores and Java. A bank, which at the present day lies below the water-surface, and extends from Australia to about 20 miles from the Timor coast, was at that period firm land, and formed the northern extremity of the Australian continent, just as the York peninsula to this day forms its north-eastern termination. This bank of land was the passage by which, in the first place, Timor and, in the second place, the neighbouring Flores were furnished with Australian species, while at the same time the Papuan forms entered it from the north-east, that is from the Aru and Kei Islands, which at that time formed a part of New Guinea. Besides this, some single specimens may have by and by entered from the Moluccas. The islands of Bali, Lombok, and Sumbawa, perhaps also a part of the east coast of Java, are of a more recent origin. By their gradual rise and closer approach to each other, they furnished a more and more convenient bridge for the Oriental genera and their entrance into the hitherto scantily-populated Flores and Timor. Later the north coast of Australia began to subside, and the immigration from these quarters was thereby cut off. Thus the Timor group was committed to the state which still characterises it.

This explanation appears to me very judicious in all its main points, and to us the only means of understanding the striking diminution of Oriental forms on progressing from Bali, Lombok, and Sumbawa to Flores and Timor. It is impossible to attribute this decrease to mere climatic differences; for the eastern extremity of Java is also arid, its climate far more resembling that of the small Malay Islands than of the western part of Java itself. It appears most likely that the chain of the small Malay Islands has not been connected with Java, since it possesses a fauna resembling that of the present day. Wallace is likewise right in supposing the former existence of a closer approach between Australia and Timor, though, let it be well understood, an *approach* only, and by no means a direct connection since the existence of a modern fauna.

On the other hand, however, a number of later investigators have proved that as sharp a line as is drawn by Wallace between Bali and Lombok, and which is principally based on his observations

upon the avian fauna of these islands, does not exist. Jentink has made this statement concerning mammals, Von Martens concerning land-mollusca, principally, however, Max Weber, by his studies of the fresh-water fishes of those islands. The same may be stated respecting insects, which, as Wallace himself has remarked, have a chiefly Oriental character as far as Timor. Max Weber, from minute investigation of the fauna of Flores, comes to the conclusion that it is decidedly more Oriental than Australian, and is of opinion that the true transition only begins east of Flores, where the Indian forms stand back more and more, giving place to the Australian, which become the more predominant the farther we progress to the east. Still I am doubtful whether, in accordance with his statements, one would be justified in drawing the demarcation-line simply between Flores and Timor. One must not forget that the avian fauna of Flores, Sumbawa, and Lombok has a decidedly more Australian than Oriental character, which is expressed by the absence of barbets, fruit-thrushes, and woodpeckers, and by the presence of cockatoos, honey-suckers, and mound-builders. Cockatoos have been also observed on the west coast of Bali; never, however, in any part of Java.

Personally I am very doubtful as to the expediency of separating the zoo-geographical regions from each other by too sharply-defined boundaries, and think it better to allow some margin on either side of a line leading through regions of a mixed character. Thus, for instance, we see that we have to give up Wallace's sharp distinction between Bali and Lombok, according to the more recent investigations of Max Weber, which have proved that Wallace has somewhat underrated the Oriental elements in the fauna east of his line as far as Timor. It is a pity that he should have so strongly emphasised this not over-important point, and that his dictum, that Bali and Lombok differ as widely respecting birds and mammals as England and Japan, should have been quoted a hundred times and introduced into almost all the books which treat of the geographical distribution of animals. I follow him absolutely, however, in what he says about the origin of the Timor fauna, and the way the Malay Islands became populated by animals, which seems to me a far more important question. Whether Celebes ought to be referred to the Australian or Oriental region is a matter I will consider later, when I come to describe my journey in those quarters.

On the morning of the 12th of November we passed the coast of Madura, an island situated as close to the north-east coast of Java as Bali is to its east. Here the sea was covered by Malay fishing-

boats, all of which possessed two outriggers and were remarkable, besides, for two different kinds of sails. The first resembled the European lateen sails. The second were narrow at the bottom, growing broad at the top, where they were drawn out into two rounded lappets; they reminded me somewhat of the wonderful winged sails I saw in New Guinea, though they were far less imposing, less bold and striking in shape, than those of my Papuan friends.

On the morning of the 14th of November the *Wodonga* entered Priok, the harbour of Batavia; but before describing my journey on shore, I needs must have a little explanation with my readers as to the continuation of this simple narrative. My stay in Australia, which lasted more than a year, has induced me to give a detailed and minute description of that country as far as it was known to me. It has been my wish to furnish a good idea of the place, of its physical features, its animal and vegetable inhabitants, and its indigenous and immigrated population. My stay in New Guinea, though of shorter duration, and enabling me only to grasp furtive impressions and observations, still tempted me to enter somewhat broadly into detail on account of the very singular and, till now, somewhat mysterious character of this most wonderful isle, which has only been opened to the explorer a comparatively short period. At the present point of my narrative I, however, enter a region connected with Europe for centuries by trade and traffic, a region abounding in European colonies, and which has given birth to an extensive literature in all living languages. Thus it would be out of place to enter into a detailed description of Java, an island cultivated throughout, and described by more competent pens than my own, my stay being but of four weeks' duration. I therefore resign every attempt at a closer description, limiting myself to a slight sketch of my impressions, and to a short statement of my scientific observations.

While in the greater part of Java the volcanic mountains rise close to the sea, not allowing a level portion of land to insert itself between them, it is otherwise in the environs of Batavia, *i.e.* the extreme west of the island. A broad strip of first level, then hilly country stretches at the foot of the mountains, so that the visitor, arriving from the sea, sees far in the distance the fine shapes of the volcanic groups of Salak and Gedeh. This beautiful sight, however, can only be enjoyed in the early morning, for, the higher the sun soars into the sky, the denser grows the mass of clouds gathering day by day in the south, and hiding away the lofty mountain-tops, which are altogether invisible from the interior of the town. Nor is one

conscious of the neighbourhood of the sea, Batavia lying at a considerable distance from its harbour, Tandjong Priok, which it takes eighteen minutes to reach by train.

The entrance into the harbour is devoid of all charm, nor was I very much struck with Batavia itself, which, in the first place, is an extensive, densely-populated, tropical metropolis, and, in the second, shows a striking absence of fine public buildings. The fashion of erecting the houses at some distance from each other causes you to lose considerable time in getting from one place to another. Still, on opening your eyes you will find an abundance of strange and interesting sights—canals running through the streets, and reminding one of the Netherlands; picturesque “Grachts,” with tropical gardens and plantations along their banks; in the inner streets Chinese bazaars, Arabs, ambulant native street-kitchens, a thousand features of Javanic life,—all this emblazoned by the glaring sun of the 6th degree of latitude.

There are many persons on whom a similar sight exercises an animating, one may even say an intoxicating, influence. He who feels more taken by Berlin and Paris than by Thuringia and the Provence will, on travelling round the globe, concentrate his interests on Singapore, Batavia, and Hong-Kong. I, for my part, much prefer a scene with but a few expressive features to a lively and crowded fair of this kind. My faculty of enjoyment and of observation is impaired by an abundance of impressions, whilst the closeness of the air characteristic of all bigger towns lies like a load upon my chest.

I had several commissions in Batavia—a visit to the German Consul, Dr. Gabriel, who assisted me kindly during the whole of my stay in the Dutch Indies, a call at the banker's, and a number of purchases. How glad was I, when, at four o'clock, all was done and I once more turned my back to that furnace of a town. I did not set out, however, from the central station of Batavia, but from the suburb, Weltevreden, a more modern part of the town, which, on account of its healthy situation at a considerable distance from the marshy coast district, forms the chief residence of the European population. Here we find the houses and villas of the Dutch merchants and officials, here the great hotels, clubs, and parks. In noble tranquillity the fine, white, gleaming buildings repose within the dark foliage of high fruit-trees and Indian figs, fanned by the breath of a fresh and salubrious air.

Batavia is notorious on account of its unhealthy climate. It is considered dangerous to spend a single night at Priok, particularly at times when any cleansing work is going on in the harbour. But

the old town of Batavia is bad enough likewise, and every European who can avoid sleeping there does so. Thus it has become the custom to do all the business in Batavia during the day, and to turn to Weltevreden for evening and night. Since the opening of this healthier suburb the European death-lists at Batavia have diminished considerably.

In less than an hour and a half the quick train took me from Batavia to Buitenzorg (which, like Sanssouci, means "care-free"), called Bogor by the Malays. The route at first leads past terraces covered with rice-fields, and along plantations of bananas and palms, among which the bamboo huts of the aborigines are interspersed. Soon we discern the mountains near Buitenzorg, the Salak, and to its east the Gedeh; their summits, however, already hidden within a dark sheet of clouds when I started, have quite disappeared on my arriving at Buitenzorg, where I was welcomed by a crashing thunder and the torrent of a tropical rain. A little wagonette, a *dos-à-dos*, took me, after a ten minutes' drive, past the villas of this rural resort, to my hotel, upon which I am unable to bestow much praise except that it fully deserves its name of "Bellevue."

Here I was once more greeted by my travelling companions of the *Wodonga*, who had arrived at Buitenzorg in the morning, with the intention of utilising the two days' stay of their ship at Batavia in enjoying the fine climate of Buitenzorg and its far-famed Botanical Gardens. The latter part of their programme was achieved to their full content; with the "hotel," however, they were disgusted, it being so entirely different from anything an Englishman associates with this word. Far from following the English style, it combined Dutch and native Malay customs in cookery, as well as in all other matters. In the evening, it is true, they had their proper dinner. For lunch, however, instead of being served fried soles or mutton chops, they had been offered a meal, the mere remembrance of which made them shudder. From one and the same plate they were supposed to eat rice, eggs, fowl, crab, small, strong-smelling fishes, a quantity of peppery stuff of which they did not even know the name,—all combined with strongly-seasoned green sauces. They told me that they had distinctly noticed how the Dutch in their hotel had taken but small portions of all these ingredients—twenty to thirty different articles at the very least—which they had mixed on their plate, thus concocting a terrible sort of *ragoût*. One of my travelling companions, a major, was so disgusted by this state of affairs that he called to the waiter to bring him some food worthy his money and a Christian gentleman.

The polite Java boys listened to these words with heads bowed down, and, without understanding a syllable, they brought the major a new supply of horrors, which so incensed his wrath that he called for the landlord, intending to vent his wounded feelings on that gentleman. He, however, proved to be having his after-dinner nap, a solemn function, disturbance of which would have been considered an outrage. In vain did a Dutch lady, who understood some English, try to appease the angry Britain, explaining to him that the food he so abhorred was the celebrated Indian rice-dish, which throughout the Dutch Indies is taken at noon instead of luncheon on account of its stimulating influence on the appetite, which is certain to wane in any one who stays in that climate for long. The rice-dish has been adopted by the Dutch from the natives, and every one who has once got used to it regards it as an excellent institution, and often thinks of it with a sort of lingering fondness after he has returned to his home over the seas. My travelling companion, however, did not prove amenable to this reasoning.

Nor did he in the least approve of the lady herself, whose costume was merely composed of a finely-embroidered jacket, and of a skirt consisting of a broad strip of cotton stuff, most handsomely designed, and wound several times round her body, leaving the feet uncovered, which, devoid of stockings, were merely encased in dainty slippers of a peculiar shape. The exclamation, "What a preposterous idea, to sit down to luncheon in such a get-up!" gives the reader the major's remarks upon the occasion in the mildest form.

Like the rice-dish, this dress has been adopted by the Dutch conquerors from their Malayan subjects. In the cotton shawl, or "sarong," wrapped close round the body in place of a skirt, and the light linen jacket or "kabaja," their stockingless feet shod in the pretty slippers of that country, the Dutch ladies of Java walk about in their houses all day, and the English and German women living in those parts follow the same convenient custom. Only in the evening, before dinner, is the native dress exchanged for a European toilette. A similar costume is worn by the gentlemen, except that in their case the "sarong" is worked into a pair of wide trousers. This attire is worn within the house, or on board ship, until the evening, and even allowed when taking the rice-dish at the *table d'hôte* of the hotel. It is only exchanged for European clothes for going out into the street or sitting down to dinner. The Dutch and all other Europeans living in those parts for a prolonged period are enchanted with this

convenient costume, and I myself found it excessively agreeable, suited to the climate, and by no means indecorous. Why should the bare feet of ladies shun the daylight more than their arms and shoulders, which they freely expose to view in Europe, under conditions which they term "full-dress"? There is, however, one circumstance combined with this Dutch fashion which, in my opinion, detracts from its advantages, and makes it an obstacle to an agreeable social life. The ladies, being obliged to change dress whenever they leave their house, soon find this inconvenient and troublesome, and end in staying at home as much as possible. At the same time, it is considered improper to visit a house as long as its inhabitants are supposed to be in "sarongs," which is, of course, a great restraint on society, restricting the hours of friendly visitation to the shortest limits. Thus we see, as with most other things in life, the advantages of "sarong"-wearing are compensated by their own drawbacks.

But to return to the major. My own arguments—founded on what I had read in books—with which I tried to support the conciliatory efforts of the Dutch lady, were impotent in reconciling my friends, the *Wodonga* passengers, to the rice-dish, and in soothing their wounded sense of propriety. Of the evening dinner, which was indeed far from good, they partook in silent but withering disdain, and this broke out into flaming wrath when, at the end of dinner, we were served cold coffee, or rather an essence of this, warmed by the addition of hot milk. This was too much for the major. He jumped up from his chair, and ordered the carriage for the next train. "Better be roasted to death in Batavia, than take another meal at this wretched hotel!" This final verdict put an end to the projected sojourn at beautiful Buitenzorg.

On stepping out upon the verandah of the hotel, after the dramatic scene just described, we found that the rain had ceased, giving place to a cool balsamiferous air, which was wafted towards us from the mountains, bathing us in its refreshing waves, while the heavens were resplendent in a bright garb of stars.

The nights in this place, which is situated more than 800 feet above the sea, and in the neighbourhood of mountains 7000 to 9000 feet high, are of an exquisite freshness. Next morning on my stepping out on the verandah, situated at the back of the house, I was greeted by a cloudless sky of the darkest blue, and by a landscape resplendent in the glory of tropical nature and in the dewy freshness of morn. The background was formed by the mighty Salak volcano, the sides of which, covered all over with dense forests, slope down

in elegant lines to the right and to the left, whilst its summit is shaped into a finely-pointed crown. The foreground of the picture was taken up by a swift and full mountain stream, the Tjidani, which seemed to come running straight towards us, as we stood before the hotel. Together with the Tjiliwong, this encircles the little town of Buitenzorg. To both our right and left we look down upon dense masses of foliage, which at first appear to be those of a primeval forest, but which turn out to be merely wonderfully rich plantations of the natives, gardens of coconut trees, bananas, and fruit trees of different kinds, interspersed with mighty groups of bamboo, which fringe the river, and shelter its banks with their tender and elegant fans. On looking closer, one will find the landscape strewn with native huts, light constructions of bamboo, erected on low poles and covered with palm-leaves. The inhabitants of Java, or, more generally speaking, the Malays, stand far above the other native races described in this book, even far above the Papuans, and it would be utterly false to range them among nations usually termed "savage." Still, their dwelling-places are little better than those of real savages, the houses of the village chiefs being alone distinguishable from the rest by a certain stateliness and more solid construction. Still, I have a special fondness for the modest little bamboo huts, the work of a few hours, which repose so snugly under the shelter of the palms and of the mighty canary and fig trees, and adapt themselves far better to their grand surroundings than the ugly lime hovels seen on the Indian continent. It must also be owned that the houses of the Europeans furnish a harmonious note in the symphony of this tropical scene. Though simple in themselves, they show to best advantage reposing gracefully on their stone columns, and gleaming prettily in their spotless whitewash, set off by the dark greens of the surrounding vegetation.

From the verandah of the hotel I descended into the bathing-house, which contains a little swimming-bath fed by a small streamlet. All about Buitenzorg, you will hear the rush and gurgle of tiny watercourses, little rills and canals made to receive the water daily lavished by the heavens, turning it to the service of the plantations and fields, and to the domestic use of the inhabitants; for water is one of the first necessities in life, as well for the Malay as for the European living in the tropics. Here everybody takes a bath at least once a day, and you do not find any hotel without a number of bathing-rooms, nor the plainest private house which does not offer every convenience in that direction. When strolling about Buitenzorg of a morning, you will see the natives at all

points occupied with their ablutions. Here you see a man carefully washing his little daughter, and, after having scrubbed her tender limbs, indulging himself in the delicious cool of a morning bath; there, again, are some women of the lower classes bathing in the river, and so clever in changing the wet "sarong" they keep on in the bath for a dry one, that the process defies the strictest sense of decorum. The poorest Coolie will bathe after any long march, or after a day of labour in the plantations; and it is only in the mountains, where the water is of an icy temperature, and the mornings and evenings excessively chilly, that these habits of cleanliness are somewhat less developed.

I believe the Malays to be the cleanest of all uncivilised races. A warm climate in itself is by no means a guarantee of cleanly habits, and African negroes, Papuans, and, above all, the inhabitants of tropical Australia show a deplorable disregard of these. Nor is it the Mohammedan religion alone which exercises this influence, for I often saw how the Haussa negroes in Africa only slightly observed the washing rites prescribed by the Koran, while the Malay Christians of the Moluccas are as rigorously clean as their Mohammedan countrymen. Thus we may regard cleanliness as a national Malayan virtue.

The European of the lower classes is, I am sorry to own, inferior in this point to the simple son of these countries. I think it a matter of course that everybody should once a day perform an ablution of his whole body from top to toe, and it is incredible that this simple custom should not be followed by every civilised individual. Still, on the Continent, it is far from being the general rule. Little children are granted a daily bath till their third or fourth year; from that time, however, washing is frequently limited to the body upwards from the waist, a warm bath taken once or—very rarely—twice a week being considered all sufficient. It is beyond my comprehension that so many highly-cultured Europeans should thus voluntarily forego the daily pleasure of a thorough bath.

In the bathing-house of the hotel I encountered most of my *Wodonga* friends, who were, like myself, charmed with the splendid sight offered by the mountains and valleys, and with the refreshing bath. Still their yesterday's wrath was unappeased, and, in spite of all the charm and freshness of this scenery, they started immediately after to spend their day in the glaring heat of Batavia and Priok. They were reconciled to these towns by the all-important advantage of meals they considered worthy of a Briton, *i.e.* such as their forefathers had eaten for centuries before them.

The distance from the hotel to the Botanic Gardens is not considerable, and I sauntered along at leisure. My purpose was to pay a visit to the Director of the Gardens, Dr. Melchior Treub, to whom I had been recommended by my German friends, and with whom I had already exchanged some letters.

The Buitenzorg Botanic Gardens are one of the marvels of the tropics, and are unequalled by any other tropical garden in the world (for the wonderful gardens of Calcutta cannot be termed tropical in the strict sense of the word). Situated at the foot of the imposing volcanoes of Java, which combine elegant outline and majestic size, they afford to the wanderer emerging from the mazes of their luxurious vegetation, a series of the most charming and striking views. Equal to the natural beauty of the Gardens is the arrangement and disposal of its plants. Though every provision is made for the wants of the systematic botanist, and for scientific classification, this is nowhere obtruded on our notice, and an exquisite artistic taste reigns everywhere. Above all, however, the Gardens are part of a scientific institution of the highest standing. More is achieved here in matters of tropical botany and tropical agricultural chemistry, be it theoretical or practical, than in any other place on earth. The Buitenzorg establishment, as a mere botanic garden, dates from the year 1817, but it owes its present position entirely to the merits of its present Director, Dr. Melchior Treub.

The growth of the Gardens from its modest beginning to its present size and importance took place under the directorship of Reinwardt, Blume, Teijsmann, and Scheffer, who was succeeded by Treub in 1880. It is difficult to withstand the temptation of entering into the exquisite details of this jewel of a garden, and of giving at least a sketch of its various charms—its celebrated canary-tree avenue, its palm-groves, and the gloomy beauty of its rondel of fig-trees. Enchanting is the view on the large pond, with the palace of the Governor-General on its shore, on the little islet situated in the middle, quite smothered in foliage. Charming, too, are the lotus flowers and *Victoria regia* floating on the waters. Since, however, all these charms have been described more than once in the works of Mohnike and Rosenberg, and more recently and in their present state in Haberlandt's *Botanische Tropenreise*, a charming book, full of interesting detail, I will refrain from further dilating upon its beauties, since all I could say would be nothing but repetition.

Besides other scientific and experimental institutions founded by Dr. Treub, we find a laboratory exclusively for the use of foreign naturalists. It is, of course, in the first place, intended for botanists

who avail themselves of it most amply. All the countries of Europe have sent investigators to it, some of whom have stayed for months or years, bent upon studying biological or physiological questions, the solution of which is possible only where tropical plants develop under their natural conditions, unmitigated by the influence of hot-houses. But the zoologist may be sure of a kind welcome likewise. All the resources of the Gardens, all the help he wants for his work, are granted him gratuitously, and personally, beyond this, I found Dr. Treub's advice and recommendations of inestimable value in my farther wanderings in the Dutch Indies.

The Dutch settled in Java 300 years ago, and they have thoroughly colonised it, and, generally speaking, its fauna may be said to be well known. Still many a hidden treasure remains, and the naturalist who is not content to study the animals as mere objects of curiosity or as anatomical specimens, but who strives to enter into a knowledge of their life and development, will find more material than he can at once master. As for myself, I was particularly interested in the evolution of *Manis javanica*, a mammal belonging to the strange group of Edentates, which in many ways are as yet a problem to the naturalist. This group owe their name to the fact that their teeth show conspicuous reductions. In some the teeth have quite disappeared, while in others we find teeth, but of a kind destitute of enamel. It is very doubtful whether all the animals we at present call by the collective name of Edentates do, in fact, form a uniform order. It is even most probable that the American representatives of the order Tardigrada, ant-bears and armadillos, have originated from a different root-stock to the Edentates of the Old World: the *Manis* of Africa, Southern Asia, and the Malay Archipelago, and the South African *Orycteropus*, the resemblance between the two groups being most probably due to similarity of habit, which has in the course of time brought about a structural convergence. Edentates of an enormous size and weird form are found fossil in the Pampas formations of South America, and here and there in the Pliocene of North America there have existed armadillos of great size, like *Glyptodon*, and giant sloths, like *Megatherium*. I succeeded in collecting a number of growth stages of *Manis javanica*, though, to my regret, only one very young specimen.

Whilst occupied with my work in the laboratory, I was continually visited by some children of the coolies working in the Gardens. These little ones were eager to bring me all the animals they could gather in the grass or among the bushes. Most of their

finds were mere rubbish, but nevertheless I took much pleasure in the little collectors themselves, charming creatures with a light brown satin skin, softly rounded cheeks, and great tender eyes. Their parents' characters were already apparent in these miniature Malays, who were reticent and modest, gentle in coming and going, and of a politeness of manner such as one rarely finds even in European children. Never did I meet one of the little imps without his greeting me from afar with his respectful and amiable, "Tabeh tuan !" (Be greeted, sir !) What a difference to the shy, but by no means modest child of the Australian, and to the bold and noisy youth of New Guinea !

Politeness, reticence, and a measured manner, form a main trait of the Malayan character. Though habit and education, with the old feudal system reigning in Java since time immemorial, have combined to enhance this quality, it is deeply rooted in the character of the Malays as a hereditary feature. That a Malay should appear impertinent, or should commit an outrage on good manners, is a thing unheard of, even if his actions bear the mark of the greatest villainy ; while anger, hatred, or vengeance, instead of being shown, are carefully hidden away under a mask of polite servility, the watch for a favourable moment in which to settle his accounts by poison, or by "kris," is nevertheless constantly maintained.

During my fortnight's stay at Buitenzorg, I took counsel with myself as to the best way of spending the five remaining months of my journey. As it was my principal aim to gather material for the study of development of tropical animals, a sphere of labour as yet much neglected, I had the choice between two main tasks : either I might repair to the forest wilderness of one of the great Malay Islands, be it Sumatra or Borneo, to devote my attention to certain mammals, the singular lemurs, the apes, and their higher allies the Gibbon and Orang-Utan ; or I might direct my steps to one of the Moluccas, and devote myself to marine zoology. Were the latter choice crowned by good luck, I might be successful in investigating the wonderful *Nautilus*, the only living relative of the long extinct race of the Ammonites. This would form a brilliant contribution to the rich material gathered by me on my voyage ; and elated by my successes in Australia, I began to see myself the happy possessor of a perfect series of developing *Nautilus pompilius*.

The next steamer for the Moluccas left Batavia on the 11th of December. Till then, I had still one week and a half left to me, so I made up my mind to spend this time at Tjibodas, a mountain

station belonging to the Buitenzorg Gardens, and situated half-way up the Gedeh volcano, in midst of a splendid forest, about 4300 feet above the sea.

At six o'clock on the morning of 1st December, I proposed to start on my trip. The carriage stood waiting as I came out of the door. Where, however, were my "respectful servants" Kudjong and Netbi? The former had been taken on by me soon after my arrival at Buitenzorg, and was to follow me in my farther expeditions, whilst Netbi was specially engaged to catch butterflies. It soon grew evident that Kudjong had prepared nothing whatever for the trip, and, as the hotel still reposed in sweet and undisturbed slumber, I was prevented from so much as procuring myself some breakfast, and I set out on my tour a lonely, hungry, and servantless man.

At this time I had still considerable difficulty in making myself understood. Having begun the study of Malayan before starting from Europe, I had quite neglected this during my wanderings in Australia and New Guinea, and had not even employed the leisure time of my sea-voyages in trying to master that easy language. The common Malayan dialect is a badly mutilated form of the fine and elaborate high Malayan, still spoken in Malacca, and in some parts of Sumatra. The conjugation of a verb in the common Malayan consists in adding the word *suda* to express the past and *mañ* to express the future. All grammar and almost all syntax have been dropped in the lower Malayan language, nor do we find any flexion of substantives. The plural is formed by a simple repetition of the word in question. Every substantive, adjective, or verb is absolutely immutable, and the different conjugations and declensions, the male and female forms, are obtained by the addition of certain words. Yet the vocabulary of the language is not poor, but enriched by a frequent combination of two words, often founded on a most poetical association. Thus the sun is called *mata hari* (eye of the day), the locomotive *kareta api* (fire-waggon).

This infantine language, which derives its elements from the high Malayan, and is used as a sort of *lingua franca* in the entire Malay Archipelago, has sprung from the necessity of the seafaring Malays to possess a means of intercommunication of ideas within the entire Archipelago. Although originally related, the Malayan dialects have developed so differently in the various islands, and even in various parts of the same island, that a West Javanese (Sundanese) talking Sundanese would not be understood by a Middle Javanese talking Javanic, nor would the latter comprehend the Maduresian dialect of an inhabitant of East Java.

Greater still is the confusion of languages on Sumatra. Everywhere, however, the traveller will be sure to find that the inhabitants of the coasts understand common Malayan. The farther we travel inland, the scarcer becomes the knowledge of this language, and in the lonely mountain regions of Inner Java it is often only the chief of a village who will understand some words of it. As a mother-tongue this dialect is now only spoken at Batavia, in the town of Ambon and on the Banda Islands. In all these places the Dutch influence, exercised for centuries together, has succeeded in supplanting the original language by this *lingua franca* of the Malayan Seas. In Banda, moreover, an indigenous population is entirely wanting.

From the day of my pitiable departure for Tjibodas I started a serious study of Malayan; for I saw the necessity of mastering this language if I intended to travel by myself about the Archipelago. Some weeks later I knew enough to make myself understood, and after a couple of months I was able to sustain a tolerable conversation. In time I even grew quite fond of the childish language and its naïve modes of expression. Moreover, its richness in vowels and its sonorous character reminded me somewhat of Italian, and I made the curious observation that the latter language disappeared from my memory in proportion as Malayan got hold of it, so that, on touching Italy on my way back, I caught myself saying *suda* for *basta* (enough), and *tida* for *no*.

Carriage-driving on Java is rather expensive, but at the same time very delightful, for the roads which cover and cross the island like a net, are excellent. Malays since olden times have been experts in horse-breeding, and the considerable demand of Java is supplied, partly by its own production, partly by importation from the islands of Sumba, Sumbawa, Rotti, and Timor, and by Celebese ponies from Makassar. Our *Wodonga*, moreover, had brought a great number of big Australian horses, specially destined for Batavia. The lively little Malayan ponies are treated well and never over-exerted. The road is divided into relays, and whenever we came to a more considerable elevation we found an extra relief in the shape of horses or oxen waiting to draw our light vehicle up the mountain. All this is managed promptly, with a certain routine, and without any fuss or noise. Thus it is pure enjoyment to dart along amid this splendid mountain scenery. The Java field labourers one chance to meet leave the road, and cower on the earth with averted mien. They would think it an impertinence to look into the face of a white man, who is not supposed to answer

their respectful salute, as this would be considered as a breach of etiquette by the Malay himself. Probably this abject civility has its origin in the old feudal system of the Malays. As to myself, my natural instinct of courtesy prompted me to answer the servile salutes of the natives by at least a slight acknowledgment.

At first our drive led us through a fine agricultural region, rice-fields laid out in terraces and watered by an elaborate canal system, which at certain periods sets all the fields under water. Then our road led up the Megamendung mountains, which are crossed by the Puntjak Pass, 4700 feet above the sea. The road is fringed by a splendid forest vegetation, beautiful tree-ferns of the genus *Alsophila*, intermixed with palms and broad-leaved forest trees, and the borders of the forest where it touches the roadside and gives access to the sun, are enlivened by bright and manifold flowers, a rare sight in these tropical woods. Here we see the great white blossoms of *Datura*, here the light shapes of different *Papilionaceæ*, and the purple umbels of *Lantana*. From the Puntjak Pass the road descends to Tjimatjan, which means Tiger River ("Tji" being the Sundanese expression for "river," which in the Malay is "kali"). Thence the road leads to Tjiwalen, and on to Sindanglaja, a place much frequented as a climatic resort, and to Tjipanas, the country seat of the Governor-General.

At Tjiwalen I was obliged to leave the carriage, and to continue my journey on foot, accompanied by a coolie who carried my luggage. After ascending a bare and shadowless ridge, we enter a wood, and are at once surrounded by the abundant vegetation of those mountain-thickets, which thrive so richly under the never-ceasing moisture of the sea winds, condensed by the cool summits of the peaks. I, however, have for once lost eyes for the splendour around me, as all my thoughts are concentrated on the one feeling of intense hunger. It is now twelve o'clock, and I, a hot and thirsty man, have not yet broken my fast. What wonder that I think of nothing but of reaching my goal with the greatest possible speed! At last the forest begins to thin. We cross a well-kept garden adorned by a splendid group of stately tree-ferns, by Australian grass-trees, and by beds of Javanese or European plants and flowers. Nestling to the side of the softly-rising slope I detect the house, constructed of the wood of the *Rasamala* tree, and near it the gardener's lodge and a number of out-houses. I was soon settled in the station-house, the gables of which may be discerned just peeping out of the trees in the picture on the following page, and was allowed to spend nine delightful days in this bower of beauty.

Being at that time the only visitor, the whole house was at my disposal, and Mr. Lefèvre, the European gardener, being confined to his bed by fever, I was left completely to my own resources. Thus I led a solitary, but by no means monotonous life. The house being furnished with a handsome dining-room, sitting-room, and bedroom, a small but well-assorted collection of books, supplemented by Dr. Treub out of the abundance of his own library, with a good laboratory, and a dark room for developing photographs, I found myself surrounded by all the advantages of modern culture, and at the same time in the very heart of tropical nature.

I know nothing to equal the delight afforded me by a combination of comfort and modest luxury with solitude and beautiful nature. In this spot I found my ideal realised. Narrow ways are cut into the forest in every direction, and are kept in order by the gardeners, who occasionally clear away some tree to keep the paths open. That, however, is all the restriction laid on this virgin country by human hands. In perfect freedom the naturalist wanders under those mighty trees, inspecting, observing, and collecting at leisure. More than that, he may set on foot investigations in the very heart of nature itself, being able to return to the scene of his experiment as frequently as he likes, for the virgin forest begins no more than a hundred yards from the house.

Many and manifold were the native forests I had touched in my voyages. I had crossed the thickets of the New Guinea coast, which are richer in colour and more alive with animals than these, and had grown fond of the wild Australian bush, in the midst of which my camp had been raised for nine months, and where my field of operation began ten steps from my tent. In those surroundings, however, I had always been obliged to fight with all sorts of difficulties, which rendered it impossible to me to undertake experiments of a more minute character. Here, however—and this was for me a novel experience—I found every condition for the most subtle scientific labour in the midst of Nature's glorious work. No need whatever for the investigator to trouble about anything but his scientific researches, to which he is enabled to apply all his thoughts, to concentrate all his energies.

A particular feature of this lovely spot is its climate. The temperature, which amounts to no more than 59° to 61° in the morning, rises to 69° to 71° at noon, falling again to 64° or 65° in the evening. During the east monsoon the night temperature is apt to sink still deeper, so that a person used to tropical climates must have recourse to warm rugs and coverings. During my stay

at Tjibodas we had several hours of rain every afternoon, and at Buitenzorg the afternoon's thunderstorm is as regular as ebb and tide on the coast of the Atlantic. On one day it begins already at midday, at twelve or one o'clock, on another at five or six in the evening. But come it does, and woe to it, if it chance to stay away, as happens about a dozen times in the course of a year. Then there will be a general rebellion, and everybody, young and old, European and Malay, will be incensed at their bad treatment by Jupiter Pluvius. Though there is not as much rain at Tjibodas as at Buitenzorg, its higher situation renders the climate particularly enjoyable, and gives us white men a vigour and readiness for work we are soon enough deprived of in the tropical plains.

Wherever we bend our steps, new and delightful scenes are unfolded to our eyes. Across a ravine, the bottom of which is occupied by an impetuous little rivulet, our gaze falls upon a green maze of plants of such denseness and variety of composition that it would require a whole book to describe every single tree or bush. One of the most striking qualities of a tropical forest is the manifold character of its elements. The trees and shrubs are not of a few kinds, as in our European woods, but almost every one of them is the representative of a peculiar species. Forests composed of one or few species like our beech or oak, fir, or pine woods, are hardly found within the tropics. Once only, during my stay on the Moluccas, do I remember having crossed a forest consisting exclusively of bamboos.

Standing on the terrace on which the house is erected, and letting our eyes rove to the distance, we perceive at the foot of the mountain the table-land bearing Tjiwalen and Tjipanas, and several white and glistening little lakes interspersed within the green. Then follow mountain ranges, rising one behind the other like the "sets" on a stage, every one of a tenderer and more hazy blue, and in the utmost distance we discover the tops and peaks of a mighty volcanic range. All day long I used to saunter about the woods, sometimes alone, sometimes accompanied by my butterfly-catcher Nerbi, and by the "forest-boy," Sapiën, who was expressly employed by the station to gather plants. My lazy servant Kudjong, who had appeared at Tjibodas one day after my arrival, I had instantly dismissed.

It was a highly interesting experience to find myself at once amidst a fauna so absolutely different to that of Australia and New Guinea. The marsupials had disappeared, but instead of them we

saw monkeys (*Cercopithecus cynomolgus*) swinging themselves in the crowns of the trees, and real squirrels darting from branch to branch. Here we found shrew-mice, martens, numerous civet cats, and panthers. Tigers have been exterminated in the Gedeh region. At Buitenzorg, however, a tiger, one known as a "man-eater," used to haunt the western slope of the Salak. For months this unwelcome guest had succeeded in evading his pursuers.

Tigers are like sharks and crocodiles: the great majority avoid man most carefully, and it rarely occurs that a tiger (generally an old specimen unable to catch stronger game, as, for instance, stags, boars, or buffaloes) when driven by hunger, ventures an attack. Once the charm is broken, the old fellow soon discovers that no other game is so easy to secure, no other endowed with such blunted senses and slow legs as the "lord of creation." From the day of this discovery the old tiger will cultivate the convenient habit of partaking of a human being for his daily meal, thereby becoming a "man-eater," the terror of a whole district. Boldly he will surprise the labourers at work in the plantations, trespass into the village streets and occupy the high-roads, all the while fearing the huntsman who has the pluck to attack him in his abode amid the jungle. His mode of procedure is viciously to dart at the foe from the ambush of a thicket, but to shun an open fight, which he only risks when driven to bay or incited to raving madness by his wounds.

Rhinoceros are likewise extinct on the Gedeh, surviving only in the tradition of the people and in some local names. A plague are the wild boars, which often break into the plantations and do serious damage. I will, however, refrain from giving a list of Javanese mammalia, as a broader treatment of the Indian fauna, which I have no more than grazed on my travels, lies outside the plan of this book. Although it differs from the European fauna in species and genera, we encounter for the greater part the same families and orders. Most of the forms are richer and brighter than the corresponding ones of our climes, an outflow of the inexhaustible wealth, the luxurious extravagance of tropical nature. Still everything appears more kindred to our European notions, and less strange than in Australia. The mountain forests up here cannot be described as very lively. Though they are not exactly poor in animals, a certain silence seems to pervade them. It is rare that we hear the tune of some little songster during the day, and the colouring of the birds appears pale compared to the winged gems enlivening the New Guinea shores. The chief ornament of these

woods is an army of brilliant butterflies of fantastic shape, flitting about the forest glades and above the grassy borders of the narrow paths cut through the thickets.

The evenings I used to devote to the collection of a great number of moths and night-butterflies, by placing a lighted lamp on the verandah of the house, and then picking off the insects, attracted in great numbers, from the white-washed walls and from the shade of the lamp itself. By this method I succeeded in collecting a fine series of specimens, several of which were unknown.

Among the various tours I undertook from Tjibodas, the ascent of the summit of Gedeh deserves mention. The whole trip does not occupy more than twenty-four hours. As it is necessary, however, to spend a night on the mountain, one is obliged to provide blankets and provisions. I therefore took two coolies for carrying those necessaries, besides being, as usual, accompanied by Sapiën and Netbi. Starting at noon, after an hour's gentle ascent we arrived at Tjiburum, a level spot in the midst of rough, steeply-rising woods. From the wall of rocks, covered with succulent green, which bound this little vale, we see silvery waterfalls descend, veiling the entire vegetation in a perpetual spray. Near the border of the little watercourses fed by these falls I saw beautiful specimens of brilliant *Nepenthes Rafflesiana*. The purple colour shown by the pitcher-shaped leaves of this plant attracts all sorts of insects, above all ants. During the first youth of *Nepenthes* the pitcher is closed by a lid. Later, however, as soon as it has reached its full development, the lid is opened, and the unsuspecting visitors, now finding free access, get drowned in the liquid which accumulates at the bottom. No chance of escape for the unhappy victims by climbing up the inner side of the murderous pitcher, which is polished like a French floor. The fluid in its interior possesses a slightly sour taste, but, until the entrance of an insect, no digestive power. I have seen the Ambonese drink this juice from the newly-burst pitchers, which they appropriately call *tampajan Setan*, or "Satan's jug," and have myself tasted it, finding it refreshing and agreeable. As soon, however, as an insect has entered the trap, the matter takes a new turn. By the help of special glands or cells a juice is secreted, which bestows upon the fluid a strongly digestive power. It soon destroys the soft parts of the unhappy victim, sparing only its indigestible chitin skin. Like other insectivorous plants, *Nepenthes* is well able to exist without its animal food, for it possesses in its green leaves an apparatus sufficient for preparing organic substances with the aid of the carbonic acid of the air; but, as we know by

Tjiburum.

experiment on other insectivorous plants, they thrive better and produce more seed when they are granted the luxury of animal food. Among the European species of insectivorous plants, *Drosera rotundifolia*, or Sundew, is the best known, being of frequent occurrence on wet heaths. All genera of the *Drosera* family catch insects, as does the common Butterwort (*Pinguicula*) and the Bladderwort (*Utricularia*), which, beside its feathery leaves, possesses curious bladders serving for the capture of aquatic insects and minute crustacea.

A detailed account of the scenery of Tjiburum would tire the reader, without giving him any true idea of this exquisite spot, but, on the other hand, it is difficult to sketch it in a few bold strokes, since its principal charm is its richness of beautiful detail. The above reproduction of a photograph taken on the spot but barely suggests its magnificence. A chief element of this charming scenery is formed by the falling waters, which hang down like a veil from the towering rocks, and by their murmur introduce life into the general silence. Another prominent feature is the light and succulent green of the mountain side, and particularly the profusion of tree-ferns, which, I think, of all existing trees, rank foremost for beauty. They possess the slender growth and the elegantly-feathered crown of the palms, but the brilliance of their green is far superior, as is the exquisite form of their leaves. Every leaflet, instead of forming a solid whole as in palms, is divided into a multitude of smaller and smaller plumules, which bestow on the plant an incomparable grace and transparency, further enhanced by the effect the daylight produces, as it falls from above into the thicket, which is kept in a continual shimmer by the denseness of the foliage, pierced here and there by a ray of sun, producing a doubly dazzling effect amidst the general shade.

Above Tjiburum the way becomes rougher, and an hour and a half of brisk climbing took us to a spot where, at 6170 feet above the sea, hot springs (*ajer panas*) rise from the glowing interior of the mountain. Crossing the dense clouds of steam which veil the course of these waters, we, after half an hour's walk, reach a desolate-looking mound strewn with rocks and stones. It is called Lebak sāat, and thence, 6400 feet above the sea, the vegetation begins to lose its tropical character. Though tree-ferns still accompany the path—not indeed as, till now, *Alsophila* species, but *Calantium chrysotricha*—we begin to miss the climbing plants and their luxurious tangles. Instead of these we discover old friends known to us from our childhood—several kinds of wild blackberries, heather,

ranunculus, and violets, and that fragrant child of our woods, the wild strawberry. Another half-hour, and we have reached an open space on which we detect a small and very primitive hut, or rather *roof* of refuge. This spot bears the name of Kā dang Badak, signifying "Rhinoceros Camp." Probably in olden times it had been a favourite resort of these clumsy animals. Darkness begins to spread, and we have reached our night-quarters just in time. Having boiled some coffee, and partaken of the food we had brought, we snugly wrapped ourselves in our blankets. Before going to sleep, I indulged in a profound admiration of the nocturnal scene spread out under the roof of the starlit heavens. Having surpassed the cloudy region, I felt very much superior to the poor people at Buitenzorg, who sat in the midst of pouring rain, while we, lucky mortals, were granted the full enjoyment of the dry and clear, if somewhat chilly tropical night.

It has always been an especial hobby of mine to compare the different human races, as to the surprising variety of their habits and the multitudinous forms in which their mental life seems moulded. At the same time, however, I have ever been struck by the identity of the more fundamental human characteristics. Love and hatred, self-devotion and selfishness, fill almost alike the heart of the Australian savage and of the classic Greek, and are frequently manifested in a surprisingly similar way. Besides these great features, I have, however, discovered quite a small one which seems likewise to be a general property, a tendency, common to all human beings I have ever encountered. It is the liking for a little chat before going to sleep, a habit indulged in by old and young, no matter whether they are dead tired after a good day's work during which they have had ample time to communicate their thoughts to each other. It was shared alike by all the heterogeneous companions of my different voyages—by the Australians in their "humpies," the Papuans on the Gara River, and the African negroes of Lokodja on the Niger, where I lay for many weeks prostrated by fever, by the soldiers in their bivouac, or the travellers I encountered in Alpine huts. I now found out that the Malayan race is no exception to the general rule, and the silence so desirable for a night's rest had to be enforced by my energetic command, "Kita orang tidur" (now we sleep).

Early next morning we arose, and, after having partaken of some coffee prepared by Nerbi, I set out for the ascent of the summit. At first our way led us through some forest, adorned by a beautiful rhododendron species, not the *Rhododendron retusum* we find lower

down, but a *Goulderia* with handsome red blossoms, and with red leaves at the end of its branches. The higher we rise the more stunted are the trees, shrivelling gradually to a shrublike condition—a phenomenon we remark when ascending a summit of the Alps. We now find ourselves almost entirely amidst a European flora, the elements of which do not occur anywhere between these regions and the mountain-sides of the Himalayas.

How did these plants come here? Is it credible that the wind should have wafted their seeds over so vast a space? It might be imagined that it would incessantly carry off vegetable germs to enormous distances, and that seeds used to a temperate or Alpine climate, incapable of thriving in the tropical plains, should have settled on the cool mountains of Java. Supposing this, we should expect to find the seeds of a particularly small and light order, or furnished with a flying apparatus. Such, however, is by no means the rule in the above-mentioned plants. It has been proved that the Peak of Teneriffe, situated far nearer to Europe, does not possess our Alpine flora, a fact incomprehensible as long as we attribute to the wind the onus of populating the Java mountains with Central Indian plants.

The explanation of this phenomenon has rather to be sought in two other considerations, supported by numerous zoological and geological facts. In the first place, we may suppose a former connection between Java and India, not by way of Sumatra and Malacca—though this appears so much more evident—but by a natural bridge passing over the Isle of Bangka, and then northwards to Siam. By this supposition alone can we explain the fact that many elements of the Javan fauna coincide rather with those of Central India than with those of Borneo, Sumatra, and Malacca, and thus we are led to suppose that for a certain period, probably during the Pliocene and till the beginning of the Pleistocene, Java and Bangka were in direct connection with the Siamese Peninsula.

Concerning Europe, it is believed that during the Pleistocene it underwent enormous changes of climate, Middle and North Europe being at times during that Period completely glaciated. It is probable that these glacial periods were preceded by great heat, and other observations prove that more gradual fluctuations of climate have, at divers geological epochs, befallen various regions of the earth. Supposing that during the period of Java's connection with Siam, the climate of this entire region should have been considerably lower than at present, it is certain that, under those circumstances, plants like blackberries, raspberries, and strawberries, violets, lilies-of-the-

View in the Gedeh Crater.

valley, honeysuckle, equisetums, oaks, and yews would have spread all over the country and down to the very shore. On the onset of the warm period, however, these plants had to leave the plains, which became hotter and hotter. Step by step they retreated to the mountains, first to the lower regions, but soon, as even these became too warm, while the glacial heights thawed, they took refuge on them. At the same period the separation of Java from the Continent set in, bringing about the present state of things.¹

At last we arrived at the lower rim of the mound forming the crater, where all vegetation ceases. After twenty minutes' sharp climbing up the steep ascent, which is covered with stones and boulders, we reach the spot where the crater's side is lowest. Its greatest height is reached in the south, where it falls off vertically towards the centre. From the slits and openings of the crater, sulphurous vapours arise.

The view around is glorious. Wherever we look we are surrounded by groups of rugged mountains, jagged peaks, and the broken walls of former craters. Above us towers the summit of Pangerango. It reaches a height of 9700 feet, whilst Gedeh only comes up to 9000 feet. Far below we discern the wide and shimmering green plains of the "Emerald Island," which, in the hazy distance, merges into the expanse of the boundless ocean.

At noon we arrived once more at Tjibodas, where I spent still four days in a most delightful but more contemplative fashion. Here I again noticed a peculiarity characterising the propagation of numerous Javan animals, which had already struck me at Buitenzorg. On collecting *Manis*, I had remarked that many of the adult females were pregnant with young of different stages, while others had smaller or larger sucklings, and some were quite devoid of progeny. This had been in November. On perusing the zoological literature of Buitenzorg, I found that another zoologist, Dr. Strubell, had collected embryos of *Manis javanica* from January to April. On the other hand, Professor Weber seems to have obtained his material during the months of July to September—according to a notice in the Laboratory Papers about his acquisition of the eggs of the Flying Gecko (*Ptychozoon homalocephalum*). As to myself, I obtained the eggs between November and March. On the whole, I found that in many Java species, the study of which was facilitated by their abundance, several individuals of the same kind proved to

¹ Any one interested in these matters will find a fuller treatment of what I have merely sketched in Darwin's *Origin of Species*, chap. xi., and in Wallace's *Malay Archipelago* and *Geographical Distribution of Animals*.

be in widely different stages concerning their progeny. This was the case with several Geckos and Skinks, with the brilliant Agamid *Calotes jubatus* (which, chameleon-like, possesses the gift of changing its colour from a vivid green to a sombre black), and with many snakes.

In Europe, on the contrary, all undomesticated animals have their sharply-marked period of propagation, the beginning and end of which fluctuate within very narrow limits. The same may be observed in the entire Temperate Zone of the northern hemisphere. In the great majority of cases the period of propagation coincides with the reawakening of nature in spring, thus beginning somewhat earlier in Southern Europe, later in Middle, latest in Northern.

The breeding period of one species is not exactly that of another, and depends on the conditions necessary for the existence of the young. Some animals pass through a second or even a third sexual period, till the month of September puts a definite end to the matter in the case of almost all European species, giving place to a resting-time of several months. On the southern hemisphere the process is very similar, as, for instance, in Australia, except that here the rut begins with the Australian spring, that is to say, in July, August, and September. This whole arrangement is due to mother Nature's plan of exposing her tenderest children to the struggle for existence at a time when the conditions for their development are as favourable as possible. This is the case in spring, when the vegetable world, the main-stay of animal life, presents its fullest display. Exceptions to the rule are our domestic animals, our horses, cattle, sheep, dogs, and swine; since under their state of domestication they are, to a certain degree, protected against disadvantageous conditions by warm stables and an ever ample food supply, wherefore they and their young are, like man himself, rendered almost independent of seasonal change.

The Tropical Zone, though not exposed to our sharply-defined changes from heat to cold and from summer to winter, is still submitted to certain regular fluctuations in almost all its regions. These consist in a periodical change from wet to dry, from a period of rain to one of drought. During the former, new grass will begin to grow upon the earth, the trees will thrive anew, producing fresh foliage, and all flowering plants will unfold their young blossoms to the light. During the period of drought the tender plants get withered, and the country, or parts of it, becomes a desert, yielding the vegetable-eating animals no food, or rendering it difficult to obtain it, as when ice or snow cover the ground of our latitudes. Thus we

see why also the tropical animals are bound down to a certain distinctly-marked period of propagation, which generally begins with the setting in of rain, and terminates with the commencement of drought.

At Buitenzorg, however, and on the slopes of Gedeh we find exceptional conditions. A period of drought does not exist. On the contrary, all the year round the earth is daily refreshed by a plentiful shower, which causes the plants to thrive throughout the various seasons, and thus the living creatures of those regions, finding in every month the same food and the same conditions of existence, are placed under conditions somewhat like those of our domesticated animals. No wonder that the period of propagation, a fixed one everywhere else, should begin to fluctuate within wide limits, not to say within the single year. My stay on Java was too short, and the series of my observations too incomplete for me to obtain a conclusive result. It would, however, be very interesting to observe how the same species, which show no fixed rutting-time at Buitenzorg, disport themselves at Batavia, which possesses a two-monthly period of drought, or in East Java, where the drought is of yet longer duration. Biological studies of this order demand a more extensive material, and closer investigation than I could bestow upon this.

On the 9th of December I left Tjibodas, repairing thence to Buitenzorg, where I engaged a new servant, Ikin by name, as companion on my Molucca journey. On the 11th I took passage at Priok on board the *Both*, a steamer of the Royal Dutch Parcels Company. She was bound for the so-called "Great Molucca Tour," a voyage which, starting from Batavia, leads along the north coast of Java, round North and West Celebes, and over the Moluccas back to its starting-point, the whole tour occupying some five or six weeks. I myself wanted to use the ship till Amboyna. Being told, however, that the *Both* was used to linger for a considerable time on the Java coast, I made up my mind to leave her at Samarang for three days, which I wished to employ on a visit to the interior of Central Java. On the 16th I intended once more to join her at Surabaja, which I should reach by the railway connecting Middle and East Java. This, my trip to Central Java, was principally due to my interest in the wonderful temples, which have survived in those regions as the only monuments of a civilisation long extinct.

From Samarang the train at first took me to Amasawa (Willem I.), whence a carriage-and-four led me across fine agricultural land to Magelang. North-west of me, to the right, I saw the powerful

cone of the volcano Sumbing, reaching a height of 11,000 feet, whilst in the south-east and to my left appeared the soft and elegant lines of the somewhat lower Merapi. The little mountain town of Magelang is a real Javanese garrison. It harbours four battalions, the presence of which serve to give the whole place a strikingly European aspect, when tempered by concessions to the tropical surroundings.

At seven o'clock next morning I continued my journey in my little vehicle, our road leading through the valley of the rivers Progo and Ello, which jointly pour their waters into the ocean of the south coast. Having crossed the Progo by means of a ferry, we, at nine o'clock, approached Boro-Budor, the most celebrated and grandest of all Javanese temple ruins. There it lay before me, a dark gray mass, reminding me of a sullen, powerful fortress of vast dimensions. The tropical sun stood considerably high already at nine o'clock, for the shadows were short, and in the glare the scanty architectural design of the edifice did not show to its best. Its appearance shortly after sunrise or before sunset is surely more imposing. The first impression conveyed to me by this vast building was that of a thing perfectly unique, an object far from pleasing to the eye, which reminded me more of a huge heap of stones than of anything else. On looking closer, however, this heap of stones was found to possess walls richly decorated by the most elaborate and interesting relief work.

The base of this edifice is a square of 380 feet; its core is formed by a hill, the natural form of which has been cut straight and corrected so as to make it serve as the central part of the whole. It is divided into five terraces of a twenty-cornered shape, the upper terrace bearing three concentric circles of bell-shaped buildings, so-called Dagops, each of which contains a more than life-size Buddha statue. These circles are situated progressively higher towards the middle. The highest and innermost circle contains a huge Dagop, which forms the crowning part of the temple, and may be seen in the picture (p. 444) overtowering the whole. Partly fallen to ruin, it contains in its centre a sitting statue of Buddha 12 feet high. Surrounding each terrace we find a broad way, enclosed between two walls. The inner wall is supported by the side of the hill, while the outer runs freely parallel with it. These walls are the bearers of most interesting alto-relievos, representing the life and doctrine of Buddha, interrupted only at regular intervals by niches containing sitting statues of that god. On each of the four sides of the temple an arch and a flight of steps lead upwards, first from the

ground to the lowest terrace, then to the second and so forth up to the summit, where the huge crowning Dagop, 123 feet above the ground, presents a splendid prospect over the severe yet beautiful mountain scenery. No man can climb this height, can walk over these terraces, contemplating their rich and manifold works of art without high delight and deep admiration. Though characterised by a certain severity, these representations possess an uncommon grandeur of style, being obviously the expression of a deeply spiritual religious feeling. Admirable is the treatment of the material, a brittle trachite very difficult to manipulate, which has, moreover, suffered much from decay, so that what we now see gives us but a shadowy idea of the former beauty of these master works. Most clever and peculiar also is the construction of this edifice, no mortar or other cement, nor braces of any sort being employed. One smoothly-hewn stone reposes on the other, attached to it by nothing but its own weight.

What must have been the height of a civilisation able to create so powerful a monument! What the art and skill of the sculptors who produced these thousands and thousands of figures! What the fancy and geniality of the man whose brains conceived the idea of the whole, and who conducted its perfect execution down to the last detail! This harmonious realisation of a unique idea, the perfect accomplishment of its smallest details, which do not once mar the general impression of grandeur, and the unmatched originality of the plan, excited my unlimited admiration.

Here, however, my enthusiasm stops, and I cannot but say that the æsthetic effect created by the whole is not proportionate to the means exerted in its production. This massive building does not possess the severe majesty characterising the Egyptian pyramids, its shape being much too broad and clumsy to produce a similar effect. Moreover the multitude of corners and niches, and the small Dagops and their cupolas, which crown the summit, distract the eyes and rob the whole building of much of the grandeur its bulk would seem to suggest. The effort of giving the edifice a certain organisation by dividing it systematically into five separate terraces, and by giving each terrace a sexangular shape, has decidedly proved a failure. The whole is, and remains, a heavy mass of an awkward form, seen from any standpoint you choose. Its effect is possibly heightened when the sun is low and the shadows exercise their delicate influence. Such conditions, however, exist but for a short part of each day, and I regret not to have seen the temple under them.

Though acknowledging all its deficiencies, the study of this

huge masterpiece was to me a matter of delight and interest, and I could not but feel humiliated before the creative power of that ancestral people, so far superior in its proud culture to the present generation of Malays. It is very possible that the creators of this edifice lived in huts of bamboo, like their descendants of to-day, for remnants of private dwellings in the vicinity of this or any other temples are completely wanting. But the gift of sculpture, which to the Javanese of to-day seems entirely lost, must at that period have

Wall Ornament at Prambanan.

been at its prime, and its neglect and disappearance is probably due to the introduction of Islamism, which religion forbids all reproduction of the human or animal form. Thus the modern Javanese, a confessed Mahometan, looks in hostile awe upon these works of his forefathers, and regards them as the outcome of diabolic influence.

On letting my eyes rove from this temple to the surrounding country, spread out at my feet in the pride of its luxurious culture, I soon perceived the origin of the architectural style which characterises these Central Javan temples. The plant principally cultivated

throughout the western half of the Malay Archipelago is rice, which from time immemorial has been nursed on so-called wet fields, laid out in terraces upon the slopes of the softly-rising hills. Thus every drop of water flowing from an upper terrace is caught by the field below, and so on, this method preventing a single drop of the precious liquid being lost. Every slope throughout the island is now covered with these terraces, a method which has certainly

Mythological Representations in Relief at Prambanan.

been exercised for more than a thousand years. No wonder the architect adapted to the building he had in hand what he daily saw around him, in the shape of the succulent green rice-fields waving in the wind, thus immortalising the terraces which to him are the embodiment of food, wealth, and everything which gladdens the heart of man.

Half an hour from Boro-Budor we find the ruins of the small Mendut Temple, a sanctuary erected upon a low superstructure, and containing a hall with three huge statues of Buddha, sitting on

a lotus flower. These figures are conspicuous by their eminently correct treatment of the human form, the expression of the divine features bearing the unwordly dignity, the majestic calm so peculiar to most statues of Buddha.

From here my journey led me to Djokjokarta, the capital of the principality of that name, which, like the principality of Surakarta, forms a nominally independent state. This independence, however, is a mere farce, and the life-guards of the two "sovereigns" are each a detachment of sixty men, consisting exclusively of Dutch soldiers, who keep a sharp look-out on the movements of the guarded sovereign. His will alone reigns above his people, but woe to him if he turns a deaf ear to the advice of the Dutch Resident, installed for his aid as "a younger brother." The Dutch fortress adjoining the princely residence shows us precisely the nature of the sovereign's independence. My stay at Djokjokarta was spent on a walk through the modern town and on a visit to the ancient princely palace, a picturesque edifice erected 170 years ago, but for long uninhabited.

The following morning I took another excursion, which led me to the wonderful ruins of the Brahma Temples, Loro Djongrang, situated a quarter of an hour from the village of Prambanan. Instead of a single temple, I found, in correspondence with the polytheistic Brahmanic religion, a whole collection of sanctuaries. Plainly distinguishable are six large temples, surrounded by a greater number of smaller ones (one generally counts fourteen). Here, as at Boro-Budor the style is characterised by its terraces. Every separate building, however, is far more slender in shape than there. The circumstance that the architect did not try to impress by massive bulk and dimensions such as we found at Boro-Budor, but preferred instead—whether following artistic feeling or religious dictates we know not—to divide the whole into a number of separate buildings, has bestowed on these temples an architectural beauty far surpassing that huge colossus. Moreover, the arrangement and relative size of the respective buildings is so finely graduated as to give the whole, in spite of the inevitable and ever-repeated terraces, a truly pleasing aspect.

The largest and central temple is dedicated to Durga or Uma (the Loro Djongrang of the Javanese) the wife of Siwa. The walls of the many-cornered lower part of this and the other temples are decorated with fine representations in relief, arranged in arch-shaped groups. From the front of the temple a broad flight of stairs leads to the first terrace, which all around shows the most elaborate relievos representing subjects from Hindoo mythology. The second

terrace bears the little temple hall, which contains the metal statue of the valiant goddess Loro Djongrang, a female possessed of eight arms and feet, each bearing a separate emblem. Another hall contains the stone monument of Siwa, a third that of Ganesa, son

Wall Ornament at Prambanan.

of Siwa and Loro Djongrang, who is adorned with an elephant's trunk, by means of which he takes food from a bowl he holds in his hand. Besides these three, there is another room containing a statue of less significance.

The large temple east of this main building is dedicated to Brahma, the west one to Vishnu, and each of the smaller temples to some other Hindoo god. Without giving a detailed description

of these separate sanctuaries, I will but call my reader's attention to the surprising power of technique, and to the life and vividness characterising the representations. The aim of these Javan sculptors was the same as that of the Greek artists, who created the celebrated friezes of Pergamon and the Parthenon; and, though far below the latter in artistic perfection, their powerful creation will still bear comparison with that of their Hellenic brothers. It would need a hundred instead of my few illustrations to convey to my reader the truth of this assertion.

No less admirable are the ornaments decorating the sides of the temples, represented in some of the accompanying prints. These temples, moreover, are but a small portion of the ruins covering a great part of that district. In their vicinity we find other extensive buildings, Tjandi Lumbung and Tjandi Seru (meaning "thousand temples"), which consist of about 250 ruins.

As for myself, my parting hour had struck, and at half-past nine I had to leave these interesting haunts to reach my destination in time. The train carried me through the whole of East Java. At eleven we arrived at Surakarta, passing an hour and a half later the little village of Ngale, near which, at Trinil on the Bengawa river, the Dutch military surgeon Eugen Dubois had, a year ago, discovered the remains of a creature considered by him an intermediate form between man and ape. As he was able to support his, at first, very sceptically-received statements by silent yet eloquent witnesses in shape of the bones he had discovered, he soon succeeded in refuting the theoretical objections of his opponents. At present the majority of competent judges agree that these bones represent the fossil remains of a long-sought "missing link." They were found in strata characterised as early Pliocene, and therefore Tertiary.

At 6 P.M. I arrived at Surabaya, where I stopped at the Hotel Insulinde. I remained there two days, and on the evening of the second a small boat, a so-called "Tambanger," took me on board the *Both*, which lay at anchor in the middle of the narrow strait separating Java and Madura. Here I once more confided myself to this good ship which was to bear me to the Moluccas, and through one of the most interesting stages of my beautiful voyage.

CHAPTER XVI

FROM JAVA TO AMBON BY CELEBES AND THE NORTHERN MOLUCCAS

THE steamer *Both* belonged to the "Koninklijke Paketvaart Maatschappij," which is subventioned by the Dutch Government, and is charged with the entire mail and the principal personal traffic throughout the Dutch Indies. The prices of this Company for the archipelago tour are somewhat high ; luckily, however, every naturalist is granted a reduction of twenty per cent. I spent altogether nearly two months on board the *Both*, whose excellent captain, Mr. A. de Bruyne, as well as all the officers, proved very amiable companions, and most obliging patrons of my scientific work. I was at the time chiefly bent upon fishing pelagic marine organisms, the so-called Plankton. This was achieved by raising the sea-water with one of the pumps of the *Both*, and filtering it through a fine gauze net, the residuum of which was retained and preserved. It was a great pity that the bore of the pumps was so fine as only to permit the entrance of the minutest organisms. A little closet next to his cabin, which the first officer, Mr. van der Lee, had arranged as a dark room for the development of photographs and the changing of plates, was kindly put at my disposal.

The passengers consisted of a number of Protestant missionaries at work in the north of Celebes, the so-called Minahassa. On Java the propagation of the gospel is forbidden to the Christian missionaries by the Dutch Government, who fear a disturbance of peace should the faith of these orthodox Mahometans be infringed upon. In other parts of the archipelago, however, the mission is active, and its work in the Minahassa is considered particularly fertile. The two families on board the *Both* had been living there for more than ten years, and one of the missionaries was just returning from Java, whence he had fetched his pretty young daughter, a bonnie lass of eighteen, who had been educated at Utrecht, and was now returning to the paternal roof.

The well-educated Dutchman will, if possible, prevent his children from growing up in India, even if born there. As soon as they are old enough to bear the journey he will send them to Europe to be educated. This custom is due to two circumstances. In the first place the body of a pure-blooded European will never thrive to perfection if he or she spend their childhood and the time of early maturity in these hot climates, which render the body weak, flabby, and languid. Secondly, the Malay domestics, whose language the children generally get to understand better than their parents', are apt to infect the young people with their ideas of morality, which are not always quite as strict as might be wished.

Besides these two families, our boat harboured two young men, Dutch Government officials or "Amtenaars," nice fellows of twenty years, just arrived from the mother country. They came straight from Delft, where the Government has founded an academy for the education of officials to be employed in the Civil Service. Having passed their examinations, they were now on the way to their future field of action. One of them had come off so brilliantly that he had won a claim on a position at Java, considered a particular favour. On the passage, however, he met his fate, in the person of the pretty and amiable daughter of the missionary; and the fond father, on coming to Priok to fetch his fair child after a separation of many years, had the pleasant surprise of saluting at the same time a promising young man, who had no dearer wish than to become his son-in-law. This proved one of the rare instances where "the course of true love" *did* run smooth. All the references the father obtained were in favour of the young suitor, who gladly gave up his Java appointment for one in the Minahassa. The Governor-General had proved lenient to this modest request, so that nothing was wanting to complete the bond but the consent of the bride's mother at Celebes, and the bridegroom's parents in Holland, in default whereof the engagement was supposed to be as yet "unofficial." It must, however, be owned that the secrecy aspired to was of a very transparent nature, and that I felt no great surprise at the news of the intended nuptials conveyed to me in due form six months later, after my return to Europe. This pretty little idyll, the cheerful love-story of Mynheer Amtenaar and "jefrouw," his bride-elect, gave a particular charm and intimacy to the little circle of human beings collected on board the good steamer *Both*.

From Surabaja our boat passed straight across the Flores Sea to Macassar on the south-west point of Celebes. The inhabitants of South Celebes, the so-called Bugi, have always been great mariners

and

singular shape, they undertake regular voyages to the Aru Islands and New Guinea. Their voyages also extend to the Moluccas, to Borneo, nay, further, to the Straits of Malacca and to Singapore. Macassar, however, is their headquarters and the centre whence they undertake their enterprise. Thus the roadstead of that town represents an ever-lively picture of Malayan traffic, while the coast itself is low and without any particular charm.

As the *Both* had to stop several days at Macassar, I took up my abode in the small European hotel, and I called on the German Consul, Mr. von Hanfstaengel, and on the Secretary of the Governor, Mr. Erdmans, to whom I was recommended. The latter proposed to me a visit to the Rajah of the great and independent State of Goa, whose territory begins immediately beyond the gates of Macassar. He is an ally of Holland, but at the same time the sovereign of his country, a neighbour capable of becoming very disagreeable if so inclined. He possesses a considerable stock of breechloaders, and his subjects are numerous and warlike. Besides he has erected a small standing army of 500 to 600 men, clad and drilled according to the European methods.

Agreeing to Mr. Erdman's proposal, I fixed my visit to the Rajah for the coming day. A short carriage drive took us past arid and uninteresting rice plantations to Goa. The Rajah being a senile and weak-minded old gentleman, his son, the Prince Royal, rules in his place. He is an intelligent-looking man of thirty, amiable, and possessed of nice, gentlemanly manners. Solemnly he welcomed us to his "palace," a house of European style, but far from European cleanliness. The furniture, though likewise European, looked rather dilapidated and shabby. Equally "antique" was the cake, served to us with the coffee. It seemed to have seen better days in its birthplace Macassar, ere fate had landed it in this singular place. Far prettier than the Prince Royal's home was the smaller house of his brother-in-law, which we visited subsequently. He himself, a young man of twenty-five, seemed a particularly intelligent fellow, and, besides, a sort of mechanical genius. All the designs and contrivances of his house, even many of the articles we saw there, were the work of his hands. Thus, for instance, the walls of the rooms were removable, and could be taken out or put in at leisure, to form great saloons or small chambers according to the momentary need or fancy of the inhabitant. The Prince even introduced us to his and his wife's bedroom, where he called our attention to the Princess's toilet-table, which, in the matter of

elegance, was hardly inferior to that of any European lady. Finally I was deemed worthy the honour of a presentation to the Princess and her suite. The ladies, though far from being beauties, were a pleasant and merry little lot, a pity only that their teeth were defaced by the nasty custom of betel-chewing. In their company I suddenly detected a wonderful, not to say weird little animal, of which I had never before seen the like. Its shape was that of a cat; head and breast, however, were of a bright pink, the hind part of the body sky-blue, the middle white, and the extremities of a vivid yellow. Struck by this apparently new species, I approached it, beginning to investigate the wonderful quadruped. Great was the delight of the ladies at my apparent deception, the more so, as Mr. Erdmans explained to them with the utmost seriousness that my vocation as a naturalist made me doubly alive to the interest offered by their neatly-painted cat. The amusement of the ladies was, however, expressed with the most delicate tact, and equally polite were the discreet smiles of the surrounding courtiers.

At midnight of that day the *Both* was to leave Macassar. Immediately after our arrival, I had given a great part of my linen and my washable-suits to a Macassar washing-man, who had offered his services to the passengers. By everything that was holy this fellow had promised to restore my property well-cleaned by the next evening. When I came on board two hours before the time fixed for starting, no linen had arrived. I was perfectly at a loss, for the clothes given to the washing-man amounted to more than half I possessed, as I had not been able to get my things cleaned since I left Batavia. I applied to the Dutch steward, who had recommended the man to me. He, however, knew nothing about him, but that he used regularly to come on board when the ship stopped at Macassar. It struck eleven, half-past eleven, another half-hour and the *Both* would start. On my asking the captain's advice, he told me to send to town, promising to postpone the starting of the vessel till two o'clock.

No person on board the ship had any idea of the washing-man's abode, and only a single Malay steward declared himself certain of recognising the fellow wherever he should see him. I hereupon asked him to look out for the man, promising him a considerable reward. Nothing, however, could induce him to do so, as the native, and particularly the Chinese, Kampongs of the larger Indian towns, are rather unsafe at night. On asking the man if he would go, did I myself accompany him, he, after a short hesitation, assented, whereon my servant Ikin felt his courage grow at once, and declared

himself ready to come as well. And lastly, the two young Amtenaars, pleasurably excited by the adventurous character of the hunt, asked to join our little party.

Thus it was a kind of military expedition that set out on the nocturnal search for my lost clothes,—three Europeans with an escort of two natives. For hours we roamed about, asking everybody we met whether he knew where some washing-man, or “*Tukang minatu*,” was living. Many a poor fellow, peacefully and diligently employed at his washing in the dead of night, was scared to death by the sudden entrance of our party. Then the Malay boy would plant himself in front of the poor innocent, would look at him critically, finishing his scrutiny with the verdict, “It is not he.” Thus we walked endlessly through the lonely and silent Kampongs, meeting from time to time some native watchman, whom we induced to accompany us and to show us the abodes of the washing-men of that quarter, this new addition to our train rendering it yet more imposing.

It was by now past two o'clock. We had searched the whole of Macassar, and it was high time to return to our boat. Our way back led us through the elegant European quarters, the New Town or Kampong Baru, a region where we least suspected our thief. On passing a brightly lit-up Dutch villa, we asked a gentleman sitting before the house whether there were some washing-men in that neighbourhood. “Certainly,” said he, “there are two in the little street near by.” So we settled to look up those two, and then definitely to give up our search. The first of the two was an unknown individual; the second, however, struck us by the studied indifference of his manner. My attention once excited by this circumstance, I looked at him more closely, and, indeed, it was our man! The fact was joyously corroborated by our Malayan oracle, who immediately began to parley with the fellow in his own language, whereupon the rogue, his mien as impassive as ever, and without even deigning to get up, reached down and lifted up a huge parcel, well wrapped up. It was my linen, my lost treasure! “Why,” he declared, “I was just going to take it on board.”—“But the steamer was to start two hours ago!” No answer. The man looked straight before him as if the whole matter was no concern of his. This behaviour proved too much for me. I stepped close up to him, looked sharply into his eyes, and, my knowledge of Malay not being up to the occasion, I said to him in good German, “You are the most infernal scoundrel I ever met. Do you understand?” The young Dutchmen laughed, even the reticent Malays risked a

smile, whilst the *Tukang minatu* alone remained as impassive as ever, except that the slightest vestige of a twinkle appeared in the corner of his roguish eyes. As for myself, I could not refrain from laying hands on the worthy's shoulders, and from giving him a good sound shake. Then we hurried on board, where we arrived just as the *Both* was at her last preparations for starting.

Our voyage touched at a number of places of the West Celebes coast, *Paré-Paré*, *Dongala* near the entrance of the *Palos Bay*, *Toli-Toli* and *Kwandang*, finally *Amurang*, *Menado*, and *Kema*, on the north extremity of the island. Wherever I could, I went on shore to collect animals, particularly beetles, centipedes, and butterflies, or to photograph the beautiful landscape and its interesting inhabitants. The part I mostly visited was the volcanic northern extremity, particularly lovely *Minahassa*, which is so beautifully cultivated as to appear a natural garden. At *Menado* I spent Christmas eve, the second Christmas of my journey (the first I had celebrated among my Australian friends at *Coonambula*). Two days our ship stopped at *Menado*. I might have employed this time on a tour to the celebrated lake of *Tondano*, and to the Falls formed by the *Tondano* river on its leaving the lake, rejoining the *Both* once more at *Kema*. Since, however, the time of departure was uncertain, I did not undertake this excursion, but contented myself with some shorter tours in the surroundings of *Menado*.

The people of *Minahassa* differ considerably from those of South Celebes, from the *Macassaras*, and the *Bugis*. Their skin is far lighter, approaching to yellow, their stature more square, and their physiognomy less typically Malayan. Their hair, however, is of the true Malayan type, black and straight. At the beginning of our century, this people, now among the best and most gentlemanly of the entire archipelago, were a perfectly savage tribe. Like the *Papuans* of to-day, they were split into small village communities, perpetually at war with each other, and speaking a multitude of dialects, comprehensible only within a small circuit. Kidnapping and head-hunting were everyday occurrences. Even cannibalism was exercised among them, and their religion was nothing but a fantastic demon-worship. It was the introduction of the coffee-plant which brought civilisation to these quarters. From one day to another this flexible tribe discarded their barbaric customs, and quickly adopted all sorts of crafts and knowledge from the Europeans and Javanese entering the country. Soon the land was covered with plantations and crossed by a network of excellent roads, pretty homesteads arising everywhere. The whole *Minahassa* professes

the Christian religion, and the people live contented and at perfect peace with each other, under the rule of the Dutch Government.

Quite different to this are the culture and national features characterising the rest of the Celebesians, the so-called Macassaras, and Bugis. Possessing from the outset a much higher national culture than the inhabitants of the Minahassa, they formed larger communities, were more self-reliant and politically independent, and

People of Amurang (Minahassa).

therefore opposed a much stronger resistance to European influence; and thus it is that the power of the Dutch Government is mainly limited to the coast districts, while the states of the interior have, more or less, preserved their independence. Yes, the interior, strictly speaking, remains to this day almost unexplored, the tribes of these parts opposing themselves desperately to the entrance of the whites. The cousins, Paul and Fritz Sarasin, who for many years were occupied with a thorough investigation of this *terra incognita*, had to contend with a world of difficulties, which they only overcame by the greatest energy, courage, and perseverance.

The Malayan type, if not too much intermixed with others, is

easily distinguishable. The skin is of a light brown, the hair of the head as black as pitch and perfectly straight, beards are rare and thin, the rest of the body almost hairless. As to stature the Malay is of a decidedly smaller cast than the average European, well-proportioned, strong, if not robust-looking, and possessed of small hands and feet, the latter being, however, rather short and broad than slender. The cranium is almost always brachycephalic, except on the Moluccas and Timor, where mixture with other races has produced mesocephaly; even dolichocephaly occurs quite exceptionally, and must, like the occurrence of curly hair, be regarded as due to foreign intermixture. Very characteristic is the physiognomy, which is rendered uncommonly peculiar by the projecting cheekbones, the short, flat nose, growing thin towards the tip, by the broad nostrils, and the black slightly slanting eyes. This Malayan physiognomy, which it would be impossible to mistake for the Papuan, Australian, or even, in my opinion, for the Polynesian, is met with on the whole archipelago bearing that name, *i.e.* on the Malacca Peninsula, the great and small Malay Islands, the Moluccas, and among the Tagalos on the Philippines. Naturally this race does not present such a unity as, for instance, the inhabitants of the Australian continent, for the perfect uniformity of a race is only rendered possible by long-continued isolation, a state excluded by the nature of this "archipelagic" population. Skilled and clever navigators as they are, passionately fond of life on sea, their traffic with the surrounding races—Indians, Mongols, and Papuans—has for many centuries been a very lively one. This explains the numerous differences which we on closer observation detect in their culture, customs, and, particularly, in their dialects. Their bodily appearance has, nevertheless, preserved a well-defined type.

There unmistakably exists a resemblance between the Malay and the Mongol races, and, for various anthropological reasons, I feel hardly doubtful as to an original relation between the two. Their separation, however, must be of very long standing; but while no resemblance whatever can be detected between their language, a marked relationship exists between the Malayan and Polynesian idioms. Since, on the other hand, the Papuan idioms contain both Malayan and Polynesian elements, and the three races have evidently mixed many times and in several regions, some ethnographers have deduced the conclusion that the Malayan, Polynesian, and Papuan races ought to be regarded as a common stock. Nevertheless, I uphold that the light-brown, straight-haired, brachycephalic Malays are no nearer related to the dark, woolly-haired, mesocephalic

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People of Dongola, near Palos Bay, West Celebes.

Papuans than are the Europeans to Negroes or Mongols. Not only their bodily but, still more, their mental features, their character, and temperament prove this beyond any doubt. On the whole, I think it erroneous to deduce a relationship between two races from a single character, as, for instance, from their language. In the same way as when treating matters of systematic zoology and botany, one ought to consider the entire aggregate of characteristics, and weigh them against each other. The possibility, however, that the Polynesians have arisen by a mixture of Malays and Papuans, the independent development of the newly-growing race being assisted by the, at that time, relative isolation of the district inhabited by them, is not to be refuted, and has been already insisted upon. It was most probably only after the termination of this developing process, however, that the dissemination of the Polynesians over the entire island range of the South Sea took place.

From Kema, which is beautifully situated at the foot of the high Klabat volcano (6700 feet), we proceeded to the Gulf of Tomini, or Gorontalo, and arrived next day at Gorontalo itself, situated near the mouth of the Bolango or Tapa stream, which forms the outflow of the lake of Limbotto. Close to Gorontalo the Bolango is joined by the Boné river, coming from the east. The town itself is situated on the delta formed by the junction of the two rivers. Most picturesque is the entrance into the mouth of the Bolango, flanked by granite mountains, which protrude their densely-covered slopes one behind the other like the "sets" on a stage. In the background we discern the high mountain ranges of the interior, while the foreground is occupied by numerous fish-garths, such as I later on saw used at the Moluccas. As our ship had to remain at Gorontalo all the day, I used this time for a long excursion into the country, following the course of the river till up to its outlet from the lake. Ikin being ill that day and unable to accompany me, I wandered along all by myself.

A zoologist who goes on land for some hours without any minute knowledge of the topography of the country, and who is thrown back on nothing but his own instincts, naturally cannot expect any very brilliant success. His work wants time and leisure; and, instead of sauntering about at random, he ought to settle down in an appropriate spot, study the surroundings thoroughly, and make friends with the people. In this manner he may, in the course of a few days or a week, be sure of success; yet days will occur where he will hardly know how fully to ensure that. This latter is the most exhausting part of the travelling naturalist's life. Tired out

Mouth of the Holango River, Gorontalo, North-east Celebes.

as he is after the wear and tear of the day, he must still devote his evenings to the preserving of the obtained animals, must skin the birds and mammals, make anatomical preparations of certain organs, like skeletons and brains, must dry the butterflies and other insects, and preserve the delicate subtle organisms in the fluids best qualified to keep them in a natural state. Lastly, he must not neglect to arrange the notes taken during the day, and to write up his diary.

On the day of which I write, however, in spite of the unsystematic way in which I pursued my researches, I was perfectly content with my success. The banks of the river swarmed with centipedes, beetles, and, above all, with butterflies. On my approaching a little village, where the children soon remarked that I pursued butterflies (specimens of *Bibisana Diana*, which abounded in those plantations), they all thronged round me, accosting me with lively gestures. Although not understanding a word of what they said, I assumed they wanted to lead me to a particularly favourable haunt of these creatures, and eagerly followed them. My expectations were more than gratified. After a quarter of an hour's walk we arrived at a small sheltered grove, but thinly grown with trees. Instead of these the grass was decked with a brilliant carpet of flowers, the playground of a multitude of the finest and largest butterflies, flying from blossom to blossom.

Whatever animals you may collect on Celebes, be they mammals, birds, beetles, or butterflies, you will notice, almost to a certainty, that they do not absolutely coincide either with those found in the western parts of the archipelago (Borneo, Java, or Sumatra) or with those of the eastern part, *i.e.* the Moluccas. At the same time they differ from the northern species, those of the Philippines, and from the southern, those of the Sunda Islands. Celebes, though lying surrounded by other islands and island groups, possesses a fauna of its own, which is by no means a mixture of that of its neighbours. Again, it is Wallace to whom we owe this discovery, and who, at the same time, has given a clear and ingenious explanation of the facts, and that so meritoriously that some of the more special points in his deductions which are open to criticism disappear beside that.

In the first place, Wallace has recorded a conspicuous scantiness of species peculiar to Celebes, which marks it out from the other great Malay Islands. Secondly, he draws our attention to the singularity of these species, which is doubly striking in a country so little isolated from its surroundings. And, finally, he points out to us that some of these singular species, instead of resembling their neighbours of the Malay Archipelago, have close allies in Central

Asia, and even on the African continent. Thus Celebes possesses a large black monkey, *Cynopithecus niger*, which, without closer relation to any Asiatic monkey, presents a decided resemblance to the African baboon. Further, we find on Celebes *Anoa depressicornis*, the "Sapi utan" or "wild cow" of the Malays, a small kind of cattle unknown in the rest of the Malay Archipelago. The most interesting of these Celebesian specialities is, however, the pig-deer, Babirusa, in which the tusks of the upper jaw, instead of growing downwards in the usual way, grow upwards, piercing the skin on each side of the snout, and curving backwards till near the eyes. These horn-like teeth render the animal unique in its kind, and quite distinct. This pig exists only on Celebes, in the neighbouring Sula Islands, and in Buru, nowhere else. *Cynopithecus* is also found on Batjan, one of the Moluccas, where, however, it has surely been introduced by some chance accident, probably by man himself. As to birds, we find a species of Roller (*Coracias*) occurring in Asia, Europe, and Africa, not, however, in any other part of the Malay Archipelago. Thus, wherever we look, we find a fauna presenting a very singular and, in some of its parts, a very ancient character.

It is beyond doubt that Celebes has received such animal forms as *Cynopithecus*, *Anoa*, and Babirusa from the west, either from Asia or from a huge continent or archipelago which spread far to the west, and of which Madagascar is, perhaps, the last remnant. However that may be, the introduction of these forms into Celebes must have taken place at a very remote period, and long before the African and Indian faunas were as sharply separated as they are at present. Whether Celebes itself formed part of that tract of land, or was only situated within its precincts, it is difficult to decide. Wallace leans to the latter view, which to him seems proved by the poverty of the Celebesian species. This, however, as I will show later on, may be explained otherwise, whereas it is most improbable that the three Simian species of Celebes, the Lemuroid *Tarsius fuscomanus*, the numerous Rodents, Viverrines, the *Anoa*, Babirusa, and the Celebesian deer, should have reached the island otherwise than by a solid bridge of land, which connected it with the main portion of the supposed continent. As involving the main question, however, this point is of subordinate importance.

Thus we are irresistibly led to the conclusion that the connection with a western continent was interrupted at a remote period, and that since that Celebes has remained detached from any greater continental mass that may have existed either to its east or west. The configuration of land constituting the present western part of

the archipelago must have taken place at a far more recent period, and the remaining Malay Islands have been thus populated by a more modern Asiatic fauna, whereas Celebes, aided by its more isolated position, has retained its ancient forms.

The fauna of Celebes, however, stands in close connection not only with the Indian or Asiatic, but also with the Australian region. The island possesses two species of the curious genus *Cuscus*, a tree-living marsupial; it possesses cockatoos, brush-tongued parrots, and a species of mound-builder (*Megapodius*). Wallace himself inclines to suppose that the two species of Australian mammalia (*Phalanger celebensis* and *Phalanger ursinus*) may have been introduced from the Moluccas by driftwood, and, personally, I consider this mode of distribution amply proved by the existence of the genus *Cuscus* on the Moluccas, by the occurrence of *Phalanger maculatus* in Australia, New Guinea, Aru, Waigiu, Banda, Ceram, and Amboyna, and by the almost equally extensive range covered by *Phalanger orientalis*, which, though not in Australia itself, is found all over the Bismarck Archipelago and on the Solomon Islands. Although Celebes, as has been seen, is inhabited by a number of Austro-Malayan types, there is no single indication that a direct connection between any larger area of the Australian region and Celebes should have existed ever since that island's separation from Asia. A glance at the map, however, will explain to us the easy entrance of Australian forms by other passages—by the Sula group, forming a chain between Celebes and Buru; by the island of Saleyer and its satellites, which lie between Celebes and Flores; and by the close proximity of the northern point of our island to Halmahera.

The fact that the Australian types found on Celebes are represented by other species than on the Moluccas may have had something to do with the circumstance that the immigration was here restricted to the occasional entrance of a few individuals.

So far I am convinced of the soundness of Wallace's theory, the more so as no arguments of weight have been raised against it from any side. On the other hand, it is rather startling that, at the end of his argument, he comes to the conclusion that Celebes has to be annexed to the Australian and not to the Indian region, a conclusion so much the more surprising, as he himself states so close a connection between this island and the western continents, and owns to a decided preponderance of Oriental types over Australian ones. Was it not he who proved this with regard to the land-birds, from which he generally starts his observations; and is not the same the case with the mammalia, and with the few genuine fresh-water fishes

and butterflies? As to land-snails, those of North Celebes, according to E. von Martens, cannot be separated from those of the Philippines, which Wallace himself declares to be derived from the Indian side.

This much, indeed, Wallace allows in his last publication of 1895 (*Island Life*, second and revised edition, p. 462). "Forming as it does the western limit of such typical Australian groups as the marsupials among mammalia, and the Trichoglossidae and Meliphagidae among birds, and being so strikingly deficient in all the more characteristic Oriental families and genera of both classes, I have always placed Celebes in the Australian region; but it may, perhaps, with equal propriety be left out of both, till a further knowledge of its geology enables us to determine its early history with more precision."

An unprejudiced examination of the existing facts cannot but lead us to an absolute acceptance of Max Weber's opinion, who decidedly refuses to associate Celebes with the Australian region, declaring its fauna to be an impoverished Oriental one, showing a strong Australian admixture. He even succeeds in finding a very plausible explanation for the impoverishment, as he proves the connection between the northern half of Celebes and the southern is only of a comparatively recent date. There exists a striking difference between the faunas of the two halves, animals of the northern half being unknown in the south, and *vice versa*. The conspicuous scantiness of fresh-water fishes leads Weber to suppose that for a considerable time after Celebes was loosened from the western continent it consisted of a group of small disconnected islets, a hypothesis explaining not only this fact, but the general poverty in species so characteristic of the island, for, doubtless, numerous species of land-animals are dependent on a greater extension of land while a certain reduction of it will infallibly lead to their extinction.

If, on the ground of all these facts and well-founded observations, we suppose that Celebes, after its separation from the western continents, was for some time but an aggregate of islets, reaching its present solid form by a subsequent rising of the land or subsiding of the ocean; if, moreover, we imagine an occasional immigration of animals to have taken place from the other Malay Islands, the Philippines and Moluccas, without deducing from that fact a closer connection between Celebes and one of these three groups, we arrive at an easy and natural understanding of the present Celebesian fauna. Supposing this, there is, indeed, no doubt that the great dividing line between the Oriental and Australian regions has to be drawn

not westward, but eastward from Celebes, and that Celebes itself has to be considered as a curious portion of the Oriental region, related to it in some ways like New Zealand to the Australian one ; while, at the same time, its geographical situation renders it part of the intermediate zone between the Oriental and Australian range. Of the further course of the dividing-line, its position in the south and amongst the small Malay Islands I have already treated.

On the evening of that day we bade farewell to Celebes, and sailed straight across the Molucca Sea to the renowned Spice Islands. Steering east-north-east we first reached Ternâte, an island which consists of nothing but the cone-shaped summit of a volcano, rising out of the sea to a height of 5270 feet. The town of Ternâte is spread out at the south-east slope of the volcano. Directly opposite lies another volcanic island, with a yet prouder and bolder-shaped cone, the isle of Tidore. Like Ternâte, it is the residence of a Sultan, formerly one of the most mighty sovereigns of the East. His power extended to the coast of North-west New Guinea, and to this day some tribes in those quarters, and part of the Waigiu people, have to pay him a yearly tribute of tortoise-shell and bird-of-paradise skins. But for this last vestige of supremacy, these Sultans, first subdued by the Portuguese, are mere phantom princes, and are kept completely in the leading-strings of the Dutch Government. The title of sovereign they have indeed retained, for the Dutch adopt everywhere the principle of preserving the ancient native dynasties, and of making these very sovereigns their instruments in ruling the country. This proceeding has proved a very wise one, and ought to be imitated by all European powers in ruling their tropical colonies. Not only does the system prevent the indigenous population from feeling suppressed under foreign rule, but for the white sovereign an indirect management of this sort is far more agreeable and convenient than direct administration. Of course such an arrangement is possible only where the European lights upon a native government which possesses an effective power and authority, as is the case in these feudal states of the Malays, in India, in Madagascar, or at Tunis. On New Guinea and the west coast of Africa colonisation and control are rendered considerably more difficult by the absence of such native sovereigns. Beside the government of his own island, the Sultan of Ternâte exercises a sort of sovereignty over the northern parts of Halmahera, the far-stretching mountainous coast of which island may be seen at no great distance from the east of the town.

During the two days we remained at Ternâte I enjoyed the

hospitality of the Resident, Mr. Bensbach, and his secretary, Mr. Sedé. The latter committed to me a fine collection of birds-of-paradise as a present to the University of Jena. In consequence of its sovereignty over part of North-West New Guinea, Tidore and along with it the neighbouring Ternāte constitute the chief markets for the exportation of bird-of-paradise skins to Europe. Mr. Sedé also showed me several living specimens of the beautiful crested pigeon of New Guinea, *Megapelia (Goura) coronata*, which he kept in a cage in his house, while Mr. Bensbach showed me his splendid collection of Celebesian weapons. On the next morning I climbed the volcano of Ternāte about half-way. The soft, lower slopes of the huge mountain are covered with thick groves of fruit-trees, among which I caught some interesting butterflies. Farther up, the mountain becomes extremely steep, deep gullies furrowing its volcanic soil, which is, however, clothed in vegetation almost up to the summit.

Ternāte and Tidore are the northern peaks of a row of volcanoes which stretches from north to south, accompanying the west coast of Halmahera. South of Tidore we find Maree, then Motir and Makjan; still farther to the south the larger Kajoa; and, lastly, a group of still bigger islands, chief among which is the island of Batchian, situated close to the south-western point of Halmahera.

On 31st December we arrived at the town of Batchian, where we remained the day. I devoted my time to a trip to the marshy and, as I was told, then rather unhealthy surroundings of the town, where I caught a number of butterflies and other insects. Batchian is, moreover, inhabited by the wonderful baboon-like monkey, *Cynopithecus niger*, introduced there probably from Celebes by seafaring Malays. Curiously enough this animal is not found on the larger Halmahera, separated from Batchian by a very narrow strait. Through the intervention of Controller Stormer I had admission to the Rajah, who promised to send me some good divers from Batchian to Amboyna, in case I should not find any there, a fear which afterwards proved unjustified.

The year 1893 began in a somewhat stormy and ungracious fashion. A strong tempest having raged during the night, we had to suffer from its followers, a violent wind and rain, all through the day. Having reached the north-east point of Bouro at noon, we tried to enter the bay of Kajeli. So strong, however, was the rain, so wild and agitated the sea, that our captain was at a complete loss to see his way; and after having stopped off Kajeli for some hours, all the while most mercilessly shaken about by the waves,

he gave up the attempt. Now we directed our course south-east, making straight for Amboyna, and in a few hours the high mountains of this beautiful island rose before our sight. We soon entered the comparatively sheltered outer bay, anchoring there just before darkness set in. The surf was very violent even here, and drove our ship so powerfully against the planks of the quay as to smash a part of the latter—a fierce welcome from a place where I was to spend a particularly peaceful time.

CHAPTER XVII

AMBOYNA

THE settlement of the Dutch on Amboyna is one of the oldest in the Dutch Indies. The Portuguese, in advance of other European nations, had appeared on the Moluccas in 1515, and, by the year 1564, had subdued the greater part of these rich and fertile islands. In 1605, however, the Dutch came upon the scene, and soon succeeded in forcing their rivals from this precious possession. They soon made Amboyna, or Ambon, the central point of their government in the East Moluccas, Ambon being the native name for the town and island used by everybody about the place, while the Portuguese Amboyna is still retained for official purposes.

Ambon may be said to consist of two neighbouring islands, the larger Hitu (in the north) and the smaller Lettimor (in the south), connected with each other only by a narrow strip of land but a mile broad, the isthmus of Passo, which divides the sea between those islands into two separate bays, that of Baguala in the east and of Ambon in the west. From Hitu, a sharply-pointed promontory, Tanjong Montafons, juts out into the bay of Ambon, dividing it once more into an inner bay (between Montafons and Passo), and into an outer, opening like a funnel towards the ocean. The entrance into this bay from without is marked by two promontories, Tanjong Alang on Hitu, and Tanjong Nusanive on Lettimor.

The town of Ambon lies on Lettimor, its suburbs spreading pretty far along the coast. Just opposite we perceive the mountainous Hitu, with the 4300 feet high Salhutu in the east, and the twin summit of the Wawani (3000 feet) in the west, whilst in front of these ancient volcanoes a chain of lower mountains is spread out. A thick mantle of forest verdure clothes these heights, at the foot of which the sea lies resplendent in its azure glory; and he who stands at some favourable point above the town, feasting his eyes on the

pretty little settlement, on the brilliant surface of the two bays, the mountains and forests opposite, and on the tender lines of lofty Ceram appearing in the distance, may well feel intoxicated by the beauty of this luxurious tropical scene, which has formed the delight of so many an old and modern traveller. But more than any other landscape does scenery like this demand light and sun, a starlit heaven, or a glorious moon; and he who looks upon Ambon on a dismal day, beneath a heavy sky, or from an unfavourable standpoint, is sure to feel disappointed, and will fail to sympathise with the other's enthusiasm.

The town itself has been described more than once, and presented for me but few objects of interest, so I will not linger to describe it. Possessing but one very indifferent hotel, situated far from the sea, in a noisy thoroughfare, the place seemed little suited to my purposes, so that I immediately set out to look for a more convenient abode. Having received from Dr. Treub a recommendation to a Dutch merchant living at Ambon, Mr. A. T. Bouman, I had recourse to this gentleman, who proved an exceedingly kind and helpful adviser.

By his aid I soon found a pretty and roomy house situated close to the sea, in a retired and verdant nook, the sheltered suburb of Tanalapan, south-west of Ambon. Being exclusively inhabited by aborigines, these surroundings guaranteed to me a protection from curious visitors or other intrusions. The house itself lay amidst a beautiful grove of fruit-trees, its narrow front and verandah looking out upon a little path used by the natives on their way to and from town. The front building consisted of three rooms, followed by a roofed hall, airy and open, except for some low partitions running along the side. I put up my laboratory in this hall, while the adjacent back buildings constituted the kitchen and the servants' rooms. The framework of the one-storied house consisted of the strong and large leaf-stems of the sago palm. Into this framework the small, even-sized midribs of the leaves were fixed and closely fitted, so as to form a dense and even wall. This excellent material, called *gabba-gabba*, at once light and solid, is used on Ambon almost exclusively instead of wood, for the manufacture of buildings as well as for chests and boxes. The roof of my house (*atap*) consisted of the folded leaflets of the same palm, pegged down side by side and forming a perfect thatch, while the strong midribs, neatly split and well-supported, constituted a tolerably elegant French floor or "parquet." Thus the whole house may be called a production of the sago palm, and when I add that it was

not only airy and spacious, but quite nicely furnished, since it belonged to a rich native, the widow of a Dutchman, who let it to me for the price of 25 florins a month, it will be admitted that I made a rather good bargain. My hostess possessed another house exactly like it, which she herself inhabited.

The little bathing-house near the main building being in a rather dilapidated condition, I commented upon it to my hostess, and on the following morning she ordered a workman, who, in a couple of hours, by means of *gabba-gabba* and *atap*, constructed a neat little house, which exactly suited my purposes. Thus one sees how the sago palm is the most useful article in these lands, superior even to bamboo, which is also used for building. It must, however, be owned that the Malay is uncommonly skilful in adapting these materials. For joining them he uses the stems of the tough, elastic, and flexible rattan palm, which can be split according to the momentary need, and which, as "Bengal cane," is in Europe used for seating common chairs.

As cook I engaged an Ambonese named Pijman, who had formerly accompanied the Italian naturalist Beccari on long journeys within the archipelago and to New Guinea. He was the father of my hostess, and had for an assistant his grand-nephew Edward, a young Ambonese of a somewhat ape-like type. Him also I took into my service later on.

Cooking-vessels, plate, and glass were in the house, so I needed nothing but provisions, tins, soda-water, rice, petroleum, wine, etc., to set up my little establishment; and Mr. Bouman was kind enough to take me to the Chinese merchant Tja Ke Beng, who possessed a shop or "Toko" in the town, where I made all the necessary purchases.

The Chinese play a peculiar part in these quarters, monopolising the entire retail business, and keeping stores in all the settlements, where they sell necessities of every sort—preserves, drinks, common and most uncommon articles alike. It is therefore quite unnecessary to take a voluminous equipment to these parts, since you are sure to find almost everything you want in John Chinaman's shop. John, however, is by no means content to follow his business in the existing settlements. His ambition drives him as a pioneer among half-uncivilised tribes, whom he initiates into the luxuries of life. Wherever he appears, riches and influence fall to his share. He will soon know how to make the natives dependent on him, will take the prettiest girls of the country for wives or mistresses, acquire the finest gardens and plantations, and make himself the true

lord of the place. Far surpassing the European or Arabian merchants in frugality, tenacity, and patience, his trade extends from year to year. Soon he sets up an office, in which he employs other Chinese and even Europeans, the retail trader becomes a wholesale merchant, entering into correspondence with London and Hamburg, whence he soon begins to draw his goods. Thus it is that many of the most extensive plantations and important businesses have passed into Chinese hands.

My friend Ke Beng of Ambon was a well-to-do specimen of this order. Besides his flourishing business he had acquired some fine grounds, and lucrative spice and fruit plantations in Ruma tiga on Hitu. He spoke Dutch most fluently, was ever polite and obliging, seeming to consider it an honour to do me any service, were it ever so unessential or of no profit whatever to himself.

While thus employed in arranging my house and laboratory, I at the same time began to prepare my scientific work. Wishing to devote myself especially to marine zoology, and knowing of a fisherman who had before been in the services of several European zoologists, of the late Dr. Brock, the Swiss Dr. Bedot, and the German Dr. Strubell, and who was consequently acquainted with the haunts of animals and the methods of capture, I began by securing him for my service. The name of this Ambonese was Udin, his home a little village close to Ambon called Batu Mera ("Red-Stone" or "Redcliffe," a name which, as I have observed, we encounter in many languages and countries all round the world). This Malayan Batu Mera is inhabited almost exclusively by Mahometans ("Orang islam," or "'slam"), whilst the Ambonese citizens are mostly Christians or "Orang serani," which persuasion is common to all the villages of Lettimor and to the east coast of Hitu. On the north coast of this island the Mahometan religion once more predominates. A very ugly distinction of the Ambonese Christians is their black church-going costume, which they don on Sundays and for all solemn occasions. For the women this very unbecoming garb consists of a long garment of black, shining, cotton stuff, or for the richer females of silk.

Ambon having been for hundreds of years a centre of Malayan and European traffic, its people naturally have not preserved any purity of race. We may suppose that the original inhabitants were the same Alfures that we find on Ceram. A long-continued and intense admixture with Ternatians, Malays of Celebes and other quarters of the archipelago, with Portuguese, and occasionally also Dutch and Chinese, has, however, ended in producing a race devoid of any sharply-defined characteristics. Very conspicuous is the fluctuation

in colour, varying from the common Malayan light-brown to a swarthy, almost Papuan hue. Thus my servant Edward was of an almost blackish brown, his hair, like that of several other Ambonese I saw, not straight and limp, but decidedly curly, whereas his aunt, my hostess, was hardly darker than an Italian peasant of the Abruzzi. A small stature is, however, common to all Ambonese.

The language of the town is the common Malay, strongly intermixed with Portuguese. Thus, for instance, a chair is called *cadera* (instead of *crossi*), a pocket-handkerchief *lenço*, the pigeon *pombo*, the forehead *testa*. In the villages a curious rural dialect (Bohassa) is spoken, which has a number of different idioms. Everybody on the island, however, understands Malay.

The Ambonese Christians are not thought much of in the Dutch Indies, being considered lazy, insolent, and immoderate in drinking. Only one quality is granted them, that of making good soldiers. Having lived on Ambon but two months, I dare not oppose my observations to the experience of years. So much, however, I must say, that my impression of the people was no unfavourable one. It is true that not only the Christian citizens, but also the Mahometans of Ambon are devoid of the eminent modesty and reserve, one might almost say the slavish spirit, characterising the true Malay, a difference probably due to the admixture of European and Alfure blood. Inconvenient as this may prove to the Dutch rulers, I, for my part, more on the lookout for human beings than for subjects, cannot consider this feature a fault, the less so as I have never experienced the slightest impertinence. That the Ambonese Christians occasionally do ample justice to the palm-wine or Saguweer (by them called *sageeru*) is indeed a fact; and I have noticed tipsy scenes at Tanalapan which would have been an utter impossibility among the sober Javanese population. Far be it from me, however, as a man who knows a little of "good old Europe," to judge an incident like this too harshly. It seems to be the *genius loci* which makes the Ambonese people drink, and not the greater freedom granted them by their Christian faith, in contrast with Mahometan restriction. My fisherman Udin, though a confessed Mahometan, was by no means superior to these temptations. In consequence of his refusal to work with any but his brethren in faith, the crew of my boats consisted exclusively of Batu Mera men. Though declared followers of temperance and Mahomet, they did not disdain to plunder my wine very freely when left masters of my prau on its return from Lettimor, an incident of my voyage I shall

presently consider. In general, I must own that these Mahometan fishermen, with whom I had to work day by day, did not appear superior to the Christian Ambonese I knew,—for instance, my cook, his nephew, and others with whom I had to deal. On the contrary, I personally like the merry folk of Ambon, who laugh and sing, dance, and enjoy their life; and I very much preferred to work with them and to accept their services than those of my abject and punctilious servant Ikin, who never spoke but in a whisper, never laughed, never waited on me but with head bowed down, all the while robbing me as impudently as possible.

This I remarked after the first weeks of my stay at Ambon. Though missing none of my articles in use, I was astonished at the rapid disappearance of the tins, the soda-water, and other provisions I had purchased from Ke Beng. This phenomenon was the more mysterious, as I hardly used the former, much preferring the excellent rice-curry my cook prepared for me with innumerable kinds of fish, the delicious lobsters, and crabs and the curious and delicate *frutti di mare* in which the bay of Ambon abounds. Often I ate this dish at noon and in the evening, and it was quite an exception that I from time to time ordered fowl, while I absolutely refused to eat the tough beef to be had on the island. Nevertheless, my preserves diminished at a rapid rate, and I resolved to ask my hostess for a cupboard in which to lock away the remaining provisions. She obligingly yielded to my request, saying after I had stowed away my things, "Ikin steals also rice and butter, Ikin steals everything he can get at." On my insisting on further explanation, she confessed to me that she and her father had long observed how Ikin practised theft in quite a grand style. He did not indeed sell his spoils, but he had used them for propitiating the favour of some Malay beauties, whom he had made the mistresses of his heart. On the whole, he had developed a great talent for playing the "grand seigneur," occasionally issuing an invitation to a bottle of my best wine, when he and my fisherman Udin, these two pious Mussulmans, would throw all their religious scruples overboard, and carouse most merrily at the cost of their unconscious master. Though relishing the humour of this incident, I did not feel bound to furnish these honest souls with any further banquets. Calling master Ikin to account, I was astonished at his readiness in confessing his misdeeds, and the equanimity with which he received his dismissal. Off he went by the next steamer bound for Java, his passage costing me a mint of money. I then engaged Edward as my servant, and had no reason to repent of this change of ministry.

My Fishing-boat, with Udin and his assistants, Guru-Guru, near Hitu.
On the rocks is a Sago palm

During the first weeks of my stay, I devoted myself entirely to the study of marine animals, which for variety of form and beauty of colour are in these regions very conspicuous. Ambon is celebrated for its handsome and multifarious shells, a speciality doubly prized in former days, when zoology was not much more than the collecting of animals' skins and shells, and a zoological museum was identical with a curiosity shop. An eminent zoologist of the old type, Georg Everhard Rumphius, who lived on Ambon for a long time, edited a book in 1795, distinguished by its acute observations, naïve and interesting and admirable on account of its excellent illustrations. He called it "*Amboinsche Rariteitkamer, of eene Bescryvinge van allerhande Schaalvischen; benevens de voornaamste Horntjes en Schulpen.*" Rumphius is buried on the island, and a simple monument proclaims the merits of this excellent naturalist.

Personally, I was interested less in these thoroughly-studied snails and shells than in other marine animals. My daily excursions were undertaken in a little dug-out with two outriggers, a boat well suited to sail before the wind, and from it I undertook investigations along all points of the outer and inner bay, accompanied by Udin and two other fishermen. During calm weather the water of the outer and inner bay is as smooth as a sheet, and from the boat you can see to a considerable depth. You will then discover on the coral-decked bottom of the sea a wonderful world of marine animals, which, weird in shape and brilliant in colour, greet your astonished sight, and which, partly attached to the ground, bear a perfect likeness to flower-beds and shrubs, thus forming a fairy-garden unlike anything you ever beheld. The Dutch term these submarine colonies very appropriately *tuine*, or gardens; the exhibitions of our European aquariums, where manifold and curious animal groups are brought to view within the narrow compass of a water-filled glass case, give a very faint idea of these Ambonese marvels. The sheltered situation of the Ambon bays enables the traveller to inspect the sea bottom as plainly as if it were one of these glass cases, a convenience nature does not very frequently offer us; for wherever sea-animals abound, the water is frequently agitated, and where the sea is tranquil we rarely find a luxuriant animal life.

Of course the sight of these natural gardens far excels anything offered to us by the finest aquarium, as everything we see is on a freer, broader scale. Here we have nature instead of art, a primeval wood instead of a diminutive pleasure-ground. The branched corals seem to form real forests, the more compact species hills and

mountains, covered by dense masses of a purple Alcyonarian, a form unknown in our seas, whilst another coral, the Sea-feather, which is also found in the Mediterranean, stands forth in bold relief, raising its elegantly-fringed shaft high above its surroundings. Each of its plumules is furnished with hundreds of tiniest polyps, which fulfil the functions of taking up food for the whole structure and of reproducing the species.

Very numerous are the "Sea-anemones" or "Sea-roses," single individuals with delicate, often brilliantly-coloured, wreaths of tentacles, appearing as if formed of light or iridescent glass. These delightful creatures, which look like blossoms from the garden of paradise, are most rapacious scoundrels. Woe to the poor little fish or crustacean exposed to a touch of those dainty wreaths! A thousand poisoned threads will be at once protruded, clinging to the victim's body, and, by help of the tentacles, drawing the powerless animal into the centre of the fatal calyx. There a hungry mouth will open to devour it, and transmit the prey to the stomach of the "blossom" lying in the axis of its apparent flower-stem. Thus we see that on comparison of these marine productions to flowers, the name of "marine gardens" is justified in an æsthetic sense only, and that the line between these animal and vegetable forms cannot be too sharply drawn.

I must resist the temptation to describe the life in these *tuine*, as we already possess innumerable accounts of similar marine phenomena. Have not the wonders of the German Ocean, the Mediterranean, and the tropical coral banks been the subjects of ample treatment in word and image? One thing only I cannot help mentioning, an item greatly enhancing the charm of these coral gardens—it is the marvellous "birds" swarming about them and flitting up and down among the branches of the coral wood. I mean the fishes which are so brilliant in colour, and of so elegant a design that they may well be compared to the parrots and humming-birds of the ærial world.

These "Coral-fishes" belong to two families, viz. the Squamipinnes and Pomacentridæ. The body in both families is extremely narrow, its vertical diameter considerable, the snout frequently prolonged into a trunk, the fins of the back and the tail sometimes strongly and fantastically elongated. Nearly all coral-fishes sparkle in the most resplendent colours—in silver and gold, ultramarine or brilliant orange. Some are uni-coloured, some covered with simple dots or with eye-spots like those of the peacock; others, again, are banded and striped in the most striking manner, showing

patterns such as were never produced by any human brain. Particularly beautiful are the genera *Chaetodon*, *Heniochus*, and *Holacanthus* of the *Squamipinnes*, and *Pomacentrus*, *Dascyllus* and *Glyphidodon* of the *Pomacentridae*. In thousands do these little fish swarm about among the twigs of the coral structures. They feed on zoophytes and other invertebrate animals, and their existence is strictly limited to coral-grounds of this kind, which alone furnish the protection and food necessary for their welfare.

Although belonging to two different orders, *Squamipinnes* to *Acanthopterygians* and *Pomacentridae* to *Pharyngognathi*, they still resemble each other very much externally, a phenomenon astonishing at first, but easily explained by the observation that similar conditions of life often produce similar results. I may remind my reader of the resemblance between animals of burrowing habits, as, for instance, *Coecilians* and blind-worms, or between placental and marsupial mammals of prey. As to the compressed shape of the coral-fishes, we may certainly consider it an adaptation to the necessity of swimming about among the coral thickets, while the trunk-shaped snouts of some *Squamipinnes* probably serve to extract their prey from badly accessible holes or slits in the coral-rock. Why, however, are most of these creatures so wonderfully decorated and of such marvellous design? Whence the astonishing similarity between the exterior of some *Squamipinnes* on the one hand and *Pomacentridae* on the other? What is the meaning of the fantastically elongated fins in *Heniochus* and others? Darwin has taught us to understand the origin of protective colours in animals, and we have learnt to consider some of the gaudy and striking colours in poisonous and badly-tasting animals as a means to alarm an assailant, and as a product of natural selection. The lively colours of the higher plants also owe their origin to natural selection, being intended to entice the honey-seeking insects, which by their presence bring about the fertilisation of the flowers. As to the splendid ornaments of many birds, they are decidedly a product of sexual selection, an opinion of Darwin's which I share, in opposition to Wallace, for reasons mentioned on page 187, but whether this explanation may be extended to butterflies and other insects is a matter I would here leave unconsidered.

To return to our coral-fishes, an explanation of their hues as warning-colours would be ill-placed, since the animals are neither poisonous nor of a distinctly disagreeable taste (one of them, the handsome *Holacanthus imperator*, more than a foot in length, and

marked by gorgeous stripes of blue and yellow, forms a favourite dish all over the archipelago). Moreover, the elaborate character of their design and the singularity of their colouring go far beyond the needs of a mere terrifying apparatus. Again, these fish are effectually protected from bigger pursuers by the thorny coral-thickets into which they can at any moment retreat. A sexual selection seems likewise excluded, since copulation is the rule only in the cartilaginous fishes (sharks, rays, chimaeras), whilst in the higher osseous fishes the male usually impregnates the eggs immediately after their deposition by the female.

How, then, shall we explain these hues, how the conspicuous colours of so many other marine productions, and particularly those of animals attached to the ground, a circumstance which *a priori* excludes all sexual selection? What signify the lively colours of many Actinians and Alcyonarians, what profit has a star-fish from being intensely blue or purple? These are questions, as yet, unanswered and worthy of more than mere conjecture. Our knowledge of the biology of lower marine animals, as well as of lower animal forms generally is still very incomplete, and future investigation into these matters will be sure to reveal a world of interesting facts.

While our boat floated slowly along over these submarine gardens, I kept my eyes fixed on the depths, and whenever I perceived a Sea-nettle, a Coral, or a Hydroid polyp, an Ascidian or an Echinoderm new to me, I stopped the boat and made Udin dive and fetch up the specimen in question. In case it was a spiny or poisonous creature, he avoided its touch by lifting it up with a piece of coconut shell.

When my fishermen were at sea they used to uncover the upper part of their body, keeping on nothing but the wide sack-like trousers, reaching below the knees, and worn by the Ambon men instead of a sarong. As they used to undress completely for diving, I could observe, while watching their movements below the water, how the upper portion of their body, which was daily exposed to the glowing sun, was of a far darker colour than the lower. Thus we see that the sun has just the same influence on a brown as on a white skin, a fact generally hidden from our observation.

The richest yield was furnished me by the reefs during ebb-tide, when low water enabled me to gather many animals by simply picking them off from the corals at a depth of 2 or 3 feet. While at work in this manner I wore strong boots I had used for many an Alpine excursion, and light sarong trousers, my men all

the while stalking about on the sharply-pointed corals with bare feet. Our best results were attained, however, by loosening large coral rocks, lying at low water in a depth of 3-6 feet from the bottom, and transporting them to the shore, where we broke them with hammers. The holes and crevices of such rocks are the home of thousands of animals. There we find crabs and crustacea of all sorts sporting on the surface, whilst the excavations form a shelter for small sea-urchins. These little prickly balls appose their spines so tightly against any projection of the stone, that I was only able to get at them by breaking the latter. Brittle-stars stretch their enormously-elongated arms through the holes of the coral rock. On my attempting to draw forth the animal by one of these it resisted, by thrusting its spines into the rock so firmly that it proved easier to tear the animal to pieces than to pull it out of its abode. A loss of one or even more, indeed of four of its five arms, the creature soon makes good by its marvellous power of regeneration. The porous and calcareous rock is also inhabited by different kinds of worms, tiny Actinians filling the smaller openings, into which they can entirely retreat by expelling the water from their dilatable bodies. The structure, size, and habits of all these creatures are closely adapted to the conditions offered them by the coral rock.

A forest of branched corals is a very perishable thing. A violent storm will destroy thousands of its tender twigs. File-fish, trunk-fish, and globe-fish in search of their food (crustaceans and molluscs), will break the branches standing in their way with powerful jaws, whilst remnants of decayed animals, or sand, stirred up by the surf, settle among the twigs, and will finally succeed in turning the delicate stony shrub into a firm rock perforated by numerous holes and excavations. At first the original coral structure is well discernible. Soon, however, the porous stone will become the habitation of all those reef-dwellers of which I have just spoken, and which have become adapted to its configuration. And just as the coral rock once modified the organisation of its guests, so the latter will now exercise their influence on their stony home. In crawling endlessly up and down the narrow caves and hollows the spiny sea-urchins and brittle-stars end in polishing the delicate surface of the rock, entirely obliterating its characteristic contour. This process, as I noticed, had already been achieved on rocks which still formed the building-ground for a living and growing coral colony. Soon, moreover, the holes become filled with the shells of decayed inhabitants, while other creatures, worms and Holothurians,

contribute a lot of sand to the structure, great quantities of which they swallow for the sake of the infinitesimal creatures which cling to its single particles. The organic substance is digested, whilst the sand itself naturally leaves their body unchanged. Thus the recesses of the coral rock become obstructed by masses of sand and small particles of all kinds, and ere yet the reef gets exposed to atmospheric influence by a rising of the ground or subsiding of the surface, it will often be changed to such an extent, that its original nature can only be recognised by its perforated structure, the finer details of its coralline formation being completely effaced. A part of this process may also be attributed to the solvent effect of a water rich in carbonic acid, whilst the surf, which continually gnaws and tears at the outer ridge of the reefs, will also play a considerable part in the obliteration of its shape. This influence will, however, be limited to the outer zone of the coral rock, whereas the agents noticed by me principally affect the inner girdle of the reef, that is to say, the regions sheltered by the land. My observations, moreover, concern less the zones of growing and living coral than the porous structure forming their base.

Coral reefs in a stationary, or almost stationary sphere, will be more exposed to all these factors than those of a subsiding area. The latter become more quickly withdrawn from the wear and tear of the afore-mentioned influences, as they soon get covered by new strata of living corals, the luxurious growth of which ends in burying them completely.

Under these circumstances it is no wonder that, while in some regions we find strata of beautifully-preserved reef-corals, others offer us an obliterated, hardly discernible mass, the original nature of which, namely, its being a production of reef-building corals, can only be guessed at. A classic example of this is given by the chalk and dolomite reefs of South Tyrol, which for a long time were a riddle to geologists, till at last they were recognised as coral structures.

Collecting on the reefs during ebb-tide, and the hammering to pieces portions of raised rock, soon rewarded me with rich results. I had greater difficulties to undergo when trying to dredge in more considerable depths, and one may well say that, unless a zoologist command a big craft, this method of marine fishing on a coral ground will generally bring him but scanty profit. A naturalist travelling by himself cannot compete with the expeditions which have been fitted out by different nations during the last twenty-five years for marine investigation; for

in a small boat, in spite of all trouble and labour, he will not attain in weeks or months what a medium-sized or even a small steamer achieves in a few days. In depths of more than a hundred fathoms, moreover, it is impossible to dredge at all from a small boat, and yet dredging in greater depths would be doubly interesting and important in these regions, since it is in their greater depths that the Molucca and Banda seas harbour an order of sponges of exquisite beauty, the Hexactinellidae, the siliceous skeletons of which assume the loveliest shapes one can possibly imagine. Hexactinellidae are not to be found in the bay of Amboyna itself, which is comparatively shallow; to collect them one would have to dredge at some distance from the island.

Neither had the fishing with a fine gauze net, which I attempted for the sake of obtaining the so-called pelagic "Auftrieb," or "Plankton," very favourable results, though I am unable to say whether the reason for this lack of success lay in the topography of the bay or in the season of my visit. At all events, I obtained far better Plankton, as to the quantity of individuals and the diversity of species, when fishing at Naples during the winter months (not to speak of Messina, which is the El Dorado of pelagic animals), than throughout January and February in the bays of Ambon and Baguala.

While the smaller pelagic animals are caught in a fine net, the larger are best taken from the sea by means of a glass vessel or a bucket. Once, on trying to secure a splendid medusa, a Rhizostomid, I was surprised to see it evade the bucket in which I was going to capture it, in a very clever and efficient manner. Never had I noticed similar behaviour in such inferior animals as medusae, for, though possessing a nervous system and organs of sense, including a certain apparatus of simple structure, apparently performing a visual function, their organisation is much too low to enable them to retreat from sudden danger in a deliberate way. At last I succeeded in capturing the handsome creature, whereupon I soon detected the cause of its clever manoeuvres; for within the vaulted disk of the medusa swam a little fish 3 inches long, which, on finding itself brought into a pail together with its companion, incessantly tried to push the medusa towards a certain direction by repeated thrusts against the inside of its disk. Of course all its exertions to free itself and its companion from their prison were in vain. For hours and hours, however, did it continue its attempts, forcing the poor jelly-

fish all the while to a giddy and maddening revolution within the bucket. Twice afterwards I caught specimens of this medusa, both times accompanied by the same little fish, *Caranx auratus*, from which we may conclude that fish and medusa live in a sort of relationship or "commensalism." The fish profits by the powerful nettle-threads of the medusa, which protect it from many foes; but whether the medusa in turn nets a profit from the presence of the fish is as yet an open question, though, from the aforementioned observation, I would lean towards an answer in the affirmative. Similar cases of a symbiosis between fishes—*Caranx melampygus* and the young of some codfishes—with the medusae, *Crambessa*, *Cyanea*, and *Aurelia*, have already been observed by Lunel and Collet, not one, however, which revealed the advantage apparently enjoyed by the medusa from the presence of the fish.

Another interesting case of similar association between different animals I once observed close to the Ambon shore, in shallow water 3-4 feet deep. There one frequently sees a large sea-urchin, *Diadema setosum*, conspicuous by its long and pointed spines, furnished with small hooks. The cousins Sarasin have made the interesting observation that these animals possess a complex organ of sight, a fact which is easily proved on bringing the hand towards the creature. It will then immediately turn its spines towards the direction whence the attack threatens. Now I repeatedly saw these *Diademas* surrounded by a swarm of little fishes. Surprised at their behaviour, I left my boat and waded through the water up to them. What was the result? All the little fishes at once hastened towards the sea-urchin, and retreated into the forest of spears, formed by its spines. Here was an excellent instance of the splendid shelter afforded to the young fishes by a companionship of this sort, which effectually protects them against all pursuit from fishes of prey. The small fishes were clever enough to leave their shelter whenever we drew any sea-urchins from the water. Thus I was prevented from catching any of them, and from ascertaining their species. The observation may, however, be easily repeated by any one fishing on the Ambon coast.

On gliding along the sandy shores in my boat, and looking down into the shallow water, I was surprised at the unequal distribution of the marine population. Often we passed hundreds of yards without seeing a single animal, whereas another spot harboured dozens of *Diademas* clustering together within a narrow space, and yet another swarms of the star-fish *Astropecten*, other places sea-urchins, such as *Scutella*, and others starfishes, like *Oreaster*, likewise

assembled in groups by themselves. This observation leads me to suppose that many of the lower marine animals inhabiting the sea-bottom are of an eminently gregarious character, a fact I have noticed particularly in Echinoderms. The gregarious appearance of the animals mentioned by me cannot be attributed to the occasional assembly of similar individuals in a particularly favourable spot, for it often happens that they flock together midst perfectly uniform surroundings. Though they seemed to give a certain preference to one spot or another, I used to find the whole party here one day, and some hundred yards distant the next. The reason of the gregarious habits exhibited by Echinoderms is as yet doubtful, the biology of the lower organisms being, as I have already mentioned, much too little known. Probably we have to seek the reasons in the conditions of propagation; not, however, in matters immediately concerning it, as I had in some instances occasion to observe the sexual immaturity of the sea-urchins and star-fishes captured.

In a similar way, other observations which I made on Ambon have to be explained. As mentioned already, a principal aim of my stay on the Moluccas was the study of *Nautilus's* development. This curious four-gilled genus occupies quite an isolated position among the existing Cephalopods. The order to which it belongs has had its prime in the oldest geological epochs—the Cambrian, Silurian, Devonian, and Trias. During the more recent geological periods, all genera but the one genus, *Nautilus*, became by degrees extinct. The four remaining species of the genus, of which *Nautilus pompilius* is the most common, are restricted to the Indian and Pacific oceans. Its curiously-shaped empty shells are very frequent on the shores of the Moluccas, on New Guinea, and the Melanese Islands, and many of my readers will have seen them among a collection of shells laid out on the open stands of some watering-place, or on the tray of a pedlar in a seaport town. It reminds one, superficially, of a snail-shell, the principal difference from the latter consisting in its peculiar vaulted partitions, which divide the interior into a series of chambers, situated one behind the other. The animal itself inhabits the outer and largest chamber. As it grows bigger, fresh shell substance is secreted near the outer opening, and the narrow interior of the inhabited chamber becomes closed in by a new partition. The brown outer surface of the shell can easily be removed, whereupon the whole shows an iridescent gloss like mother-of-pearl. Most of the *Nautilus* shells are offered for sale in this state.

The first reliable studies of the life of this animal and the characters of its soft parts, we owe to good old Rumphius. Frequently though the empty shells of Nautilus are found, one rarely comes upon the living animal, which passes its life in great depths of the ocean, being only carried to the surface by some tempest, when it generally reaches the shore in a half-decayed state. The empty shells, on the contrary, always float at the surface, since the chambers behind the inhabited one contain air.

A study of this creature's development would prove of much importance, as leading to the solution of numerous problems, interesting alike to the palaontologist and to the zoologist. Great, therefore, was my disappointment when Udin told me that during the north-west monsoon Nautilus was very rarely caught either at Ambon or off the neighbouring isles, and that it was not unfrequently found during the south-east trade-wind. At Ambon, he told me, the animal is caught with fishing-rods baited with fish of medium size; while the aborigines of Fiji capture it in curious basket-traps furnished with a barbed fishing-hook. This basket, which contains as bait boiled crab, is lowered to the coral-bearing sea bottom. Attracted by the delicacy, Nautilus will boldly enter the interior of the trap, whereupon a quick pull at the fishing-hook will detain the daring intruder, effectually preventing its escape.

I was very much surprised that Nautilus should only show itself at Ambon during the period of the south-east wind, but my own experience proved this true. Not one Nautilus did I find during my stay. When I left, I provided Udin with spirits of wine and bottles, and charged him with the acquisition of the animals; and he procured me no less than six specimens between May and September. It is probable that Nautilus is wont to live far from the coast on the bottom of the deep sea, and only visits shallow waters to deposit its eggs; and this supposition is confirmed by the fact that every one of the specimens sent to me by Udin were mature and about to spawn.

My Ambon fishermen told me that the sea near the coast was altogether far richer in animals during the south-east than during the north-west monsoon, a fact which renders my hypothesis about the wanderings of the spawning animals doubly probable. Observations I had formerly made on Heligoland coincide perfectly with these Ambon experiences. There I had pursued the task of studying the development of a starfish, *Asterias rubens*, very frequent in the shallow water off the coast. Great was my surprise and that of my fisherman, Hilmar Lühns, when, on searching for this starfish

in the beginning of April, we vainly sought for a single specimen in spots usually abounding with it, whereas many were extracted from greater depths by the ropes of our anchor, to which they used to cling. All these specimens, however, were immature. About the middle of April some individuals began to appear in the vicinity of the shore, all of these containing ripe sexual products; whilst the animals extracted from the deep were, as before, immature. By the end of April, mature starfish were abounding all along the coast. This instance seems to me to prove beyond doubt the fact that some Echinoderms likewise leave the deep sea on the approach of spawning-time for the shallow waters near the coast.

On Ambon I pursued still another group of animals, the closer investigation of which would be of eminent zoological interest. These were the brilliantly-coloured Echinothuridae, a family of sea-urchins, which are enabled by a peculiar muscular system to move and displace the plates composing their armour. It is probable that this feature is a primitive one, and that the fixedness of the plates in other sea-urchins is a more recent character. The Echinothuridae are also remarkable for a particular poisonous apparatus contained in their hollow spines, the construction of which is very similar to the poison-fang of venomous snakes. The cousins Sarasin have caught numerous specimens of a member of this family, *Asthenosoma urens*, off Ceylon, in the shallow water of a harbour, and have been the first to give an account of the anatomy of this extremely interesting animal. But impatiently though I looked out for the brilliant creatures, and eagerly though I strained my eyes, when gliding along over the clear surface, their conspicuous forms were nowhere to be seen. Then I was seized by the idea that the same conditions which deprived me of Nautilus, and which I had observed among the starfish of Heligoland, might also apply with regard to this creature. Therefore I described it to Udin as well as I could, pointing out to him the comparative softness of its body, the undulating movements which run over its surface when the plates underneath are shifted, its brilliant hues, and the uncommon virulence of its poison. Now *radjong* is the Malayan for "poisonous," and *lombok* for "soft"; and hardly had I pronounced these two words, when Udin, with a look of comprehension, told me that "*radjong lombok*" was indeed frequent in these waters, but, like the others, during the south-east monsoon only. So I instructed him to add to the promised Nautilus a number of "*radjong lombok*." And, actually, among the yields of his fishing during the next south-east monsoon, I

found numerous Echinothuridae of the genus *Asthenosoma*, probably *Asthenosoma urens*, i.e. the same species, which was gathered by the Sarasins on Ceylon. Here it likewise appears certain that the animal approaches the coast during spawning-time, for the organs of reproduction were perfectly ripe in all the specimens sent to me. Thus I have been able to determine, within a short time, three instances of periodical wanderings in marine animals usually inhabiting the bottom of the deep sea.

So far as I know, periodical migrations of this sort have not yet, or very rarely, been observed in such animals. Though one says of the lobster that it will move to shallower water for spawning purposes, still this must not be regarded as a real migration. On the other hand, it has been known for a long time that marine animals of a swimming nature, jelly-fishes and other pelagic invertebrates, as well as fishes, undertake very extensive wanderings, both as to distance and depth. Surface-fishes, like mackerels, unite in great swarms to accomplish their spawning near the coast; while the cod-fishes, generally living in deeper waters down to a depth of 120 fathoms, do not dare approach the coast any nearer than is allowed by the composition of the water for the time being. The fact is that they are easily affected by fresher water, and therefore forced to evade the zone of that which frequently surrounds the coast.

Perhaps my readers will have been surprised to hear of sea-urchins hiding in the holes of the coral rock, and jamming their spines so tightly against the walls of their habitation that it is impossible to draw them out without smashing the rock; of others armed with sharp spines covered all over with tiny thorns; and, lastly, of some carrying a poison apparatus in the hollow of their spines. For what purpose do creatures with bodies consisting mainly of a tough calcareous shell, require such potent means of defence, such terrible weapons? Are there any animals which will attempt to attack a mailed and armed starfish, a sea-lily, consisting rather of lime than of flesh, or a Holothurian, the skin of which is completely beset by small calcareous warts, often mingled with pointed hooks and needles?

The investigations I made in the Mediterranean in former years have answered this question in the affirmative. There are indeed foes dangerous to these hard-skinned delicacies, and these are not, as might be supposed, rapacious fishes or crabs, to which one would in the first place ascribe a taste of this kind, but animals one would hardly believe capable of such feats of strength.

In 1854 the German naturalist, Troschel, noticed that whenever

after breaking their shells, he irritated certain large sea-snails, the well-known Tritons and Doliums, the animals used to spurt out of their mouth a clear liquid, containing from $2-4\frac{1}{4}$ per cent of free sulphuric acid. Troschel considered that this secretion served for defence, whereas the Italian zoologist, Panceri, very justly remarked that the apparatus in question was not to be accounted for in that way, no enemies being powerful enough to molest the mighty Triton, the shell of which can only be shattered by violent blows with a hammer, and which are able to shut the opening of their house entirely by a strong lid attached to their foot. Then other hypotheses as to the destination of the acid were brought forward, till at last it was declared to be a mere product of secretion, or a factor in the animal's digestion. On closer inquiry, however, all these explanations have proved fallacious.

I myself, while staying at Naples, had ample occasion to observe how the aforementioned sea-snails show a marked predilection for holothurians and starfishes, and how, within an astonishingly short time, they overpower the calcareous, thorny creatures, devouring and digesting them as if they were soft worms or oysters taken from the shell. Further investigations enlightened me as to the nature of this process. I saw that the destruction of the calcareous substance of the Echinoderm takes place in this manner: the sulphuric fluid is, as we have known for long, secreted by two large glands, so-called salivary glands, which lie close to the stomach, and open through two long canals on the right and left of the radula, the principal rasping organ of snails. The snail now attacks the calcareous skeleton of its prey, corroding the chalk by the strong acid, which is poured forth over it drop by drop, whereas the radula grinds and brushes it to powder, the organic substance below and between the calcareous particles passing into the assailant's stomach. This process of corroding and grinding is continued until the destruction of the prey is completed. A large Triton is able to destroy the calcareous parts of an *Asterias glacialis*, of about a foot in diameter and a quarter of a pound in weight, within twenty-four hours. "Sulphurous" snails which, besides the above-mentioned species, comprise Cassis and Cassidaria, Pleurobranchus, and many others, are also known to attack calcareous sponges and other animals protected by chalky secretions, as, for instance, Alcyonarians and Ascidians.

Most Echinoderms irretrievably fall a prey to foes armed with such powerful weapons, though sea-urchins generally save themselves by marching away quickly on their "ambulacral" feet. Of course

such forms as *Diadema*, armed with long and pointed spines, enjoy a particular advantage, since they are able to escape ere the snail can well take hold of them. Other sea-urchins creep under stones, or prop themselves so tightly against the sides of their hiding-place, that their enemy cannot draw them out. Others, again, take up their abode in shallow water, where the large and slow snails are unable to follow them, for fear of being left on dry land at low-water. *Asthenosoma*, generally an inhabitant of the deeper-water regions would be particularly endangered, were it not for its terrible poisoned spines which protect it, while its gaudy colours proclaim from afar their *noli me tangere* to all the enemies about the place. That the tropical Echinoderms possess stronger weapons than those of the Mediterranean and the northern oceans is not surprising, if we consider that the number, size, and power of their foes is far superior in the tropical seas. In this matter these resemble the tropical countries; the energy of life, the size, beauty, valiance, and virulence of their inhabitants is heightened, and the weapons of attack and defence are more powerful.

On sauntering about the sandy beach before my house, I often perceived that during ebb-tide the sand was by no means smooth, but covered with millions of tiny star-shaped heaps of sand. In the centre of each little heap I remarked a small canal, leading into the ground and serving as a lodging to a tiny crab *Myctiris longicarpus*. While the water covers the beach, the crab remains below the surface. Hardly, however, has the shore become dry, than it will pop up, throwing out the sand above its hole and chewing it to infinitesimal particles in search of tiny organisms imbedded in it. As thousands and millions of little crabs pursue this occupation at the same time, the coast soon has the appearance of being prettily and carefully raked, like a well-kept garden. Besides these tiny patterns, I also observed larger figures, each forming a sort of star with five rays. They were especially visible when the sand was about to dry, and were due to the starfish *Astropecten*, which buries itself during low water, leaving its form in doing so upon the surface of the sand.

My fishing in the bay of Ambon daily brought me an abundance of new observations, and of fine new material. Generally I started on my day's work soon after sunrise, and steered to the coral reefs in the north of Ambon, or to the shore of Hitu, unless I preferred to dredge in the middle of the bay. Between ten and eleven I used to return, and immediately settle down to preserving the yields of the morning. At one o'clock I took my dinner, generally consisting of

Pijman's delicious rice-curries. In the afternoon, during the first part of my stay, I used to go out fishing again. Later, however, I preferred to spend these hours on inland trips, as the enormous heat of the afternoon sun generally spoiled the tender organisms before I could get them home. Moreover, the prolonged effect of the oppressive climate had lessened my energies, so that I began to indulge in an after-dinner nap.

Though perfectly healthy now as before, I began to feel the influence which these two years of bodily fatigue, the manifold wear and tear under the rays of a tropical sun, as well as the continued mental strain could not fail to produce. I became languid and indifferent, lost my appetite and took to a long siesta at noon, in which all Europeans living in those quarters indulge—a state befalling almost every one who has had to live and work in the tropics for a long period.

Dr. Treub, who has for so many years lived and worked very energetically under the glowing sun of Java, told me how carefully we ought to economise our strength, if desirous of preserving all our abilities. Though considering a moderate bodily exercise as necessary for the keeping up of one's elasticity, the best method being that of daily fulfilling a constitutional task, he warned me not to indulge in any superfluous excitement or worry, a state the Malays express as *susah*. During the first years of his stay he, too, had been occasionally inclined to worry, to hurry, or to indulge in cares or regrets of some sort. Now, however, he had taken to say "this is *susah*," and the steadiness and tranquillity produced by this reflection he considered far more favourable to a fertile state of mind than the impulsive eagerness of former years.

A traveller who is incessantly exposed to fresh circumstances and surroundings, as I was, can often hardly avoid falling a prey to *susah*, and will be sure to experience a strong nervous relaxation. This in my case showed itself in a complete failing of the appetite, so that I refused to eat anything but hotly-seasoned curries and fruit, my menu both for dinner and supper. Luckily the fruit was of unequalled excellency, furnishing me true delights, such as my tongue had never before experienced. In passing the market on my arrival at Java in November, I had been struck by an odd and disagreeable smell, reminding me at the same time of musk and onions, and evoking the idea of something rotten and about to decay. I soon perceived that this odour arose from some large, slightly oval fruit, bigger than a coconut, of a green colour, and densely covered with strong pointed spines. This heavy fruit grows on

whom it will, of course, inflict painful wounds by its strong spines. The name of the tree is *Durio zibethinus* (the Malay "Durian"). Its range is restricted to the Malay Archipelago, the inhabitants of which are passionately fond of the white creamy mass which surrounds the seeds in its interior. The smell, however, is so offensive to any one not used to it from childhood, that very few Europeans who come to the Indies as grown-up people are able to conquer their disgust. In the hotels it is forbidden to introduce Durian or to eat it indoors, its odour making itself felt all through the house. In the bath-house only are you allowed to have it opened and to enjoy its flavour. Durian has attained a celebrity far beyond its native home, by the fact that Wallace, the eminent naturalist, dedicates several pages of his *Malay Archipelago* to a praise of its merits, giving us a truly classical account of this "king of fruits." He writes as follows: "The five cells of Durian are satiny white within, and are each filled with an oval mass of cream-coloured pulp, imbedded in which are two or three seeds about the size of chestnuts. This pulp is the eatable part and its consistence and flavour are indescribable. A rich butter-like custard, highly flavoured with almonds, gives the best general idea of it, but intermingled with it come wafts of flavour that call to mind cream-cheese, onion-sauce, brown sherry, and other incongruities. Then there is a rich glutinous smoothness in the pulp, which nothing else possesses, but which adds to its delicacy. It is neither acid nor sweet nor juicy, yet one feels the want of none of these qualities, for it is perfect as it is. It produces no nausea or other bad effect, and the more you eat of it, the less you feel inclined to stop. In fact, to eat Durians is a new sensation, worth a voyage to the East to experience."

In my Buitenzorg hotel I had met with two rich American ladies, who, full of the enthusiasm awakened in them by Wallace's book, had come to the East to see the Orang-Utan and the birds-of-paradise in their native land, and to eat Durian. At present they were, however, too timid to walk by themselves in the Botanic Gardens for fear of snakes, nor could they make up their mind to touch that badly-smelling fruit. As for myself, my reluctance to this wonderful food was soon conquered. Had I not, in my character of naturalist, always considered it my duty to become acquainted with the national dishes in the various countries I touched on in my journeys? Thus, I had partaken of the edible sharks at Naples, had eaten tripang on Thursday Island, and had tasted the baked

grubs of goatchafers so dear to the Australian's palate. Was I, then, to keep aloof from the mysterious merits of Durian, this sphynx among the fruits? Manfully I attacked its stubborn charms, and soon felt rewarded by the delight thereby afforded me. One precaution, however, is necessary; you have to eat the fruit before dinner and not for dessert, for fear you remain infected with its smell, which is not to be removed by mere rinsing of the mouth, and which makes you an object of aversion to everybody, even to yourself. On Ambon there also exists a variety of *Mangifera foetida*, a fruit of permeating smell, eaten only by the natives. Having once overcome my disgust, I found it delightful likewise. The same is the case with these fruits as with our strong-smelling cheeses, either one will feel disgusted by their taste or will like them excessively.

The Malay region bears, however, other fruits less difficult to estimate, the taste of which is agreeable to any one happening to partake of them, and which are to be procured without any great difficulty. These consist, besides the delicious banana ("Pisang" in Malay), of the common aromatic mango, *Mangifera indica*, a fruit possessing a curious but agreeable flavour of turpentine; further the splendid "Rambutan" (*Nephelium lappaceum*), "Papaja" (*Carica papaja*), "Mangustan" or "Mangis" (*Garcinia mangostana*), and finally, the excellent bread-fruit (*Artocarpus incisa*) and "Mangka" *Artocarpus integrifolia*. Pine-apples and "Sirikaia" have been introduced from America, and thrive splendidly; while the Indian oranges cannot be compared to the Italian, and the melon-sized giant orange, *Citrus decumana*, called "Pompelmus" by the Dutch, is very inferior to the latter in flavour.

Amboyna also produces wine, if not from grapes, from the vine palm, *Arenga saccharifera*. This palm presents a very singular aspect; not only are its leaves of a dark bluish green instead of the vivid succulent colour characteristic of most other palms, but it has a rough and rugged appearance owing to the state of its older leaves, which hang down ragged and torn, and are frequently broken off so as to leave nothing behind but the bare stalk. Thus the palm presents the neglected look of a drunkard, a striking comparison made by old Rumphius.

To secure its juice, the Malays cut off the young spadix, collecting the forthcoming sugary liquid in vessels of bamboo, which they hang to the tree. While the wine is fermenting, they throw in pieces of the root of *Garcinia picrorhiza*, thereby giving the drink, which is partaken of before the fermentation is terminated, a pleasantly acid taste. This palm wine is usually designated in the archipelago

"Saguweer," whilst in Ambon it is commonly called "Sageeru." How often was I refreshed by a draught of this native champagne, when, on climbing about the mountains, I met with girls or women, who carried their wine to the Ambon market in earthen jugs. Gladly did the dusky Hebes stop to present a goblet of their white and foaming drink to the thirsty wanderer. The faintly alcoholic Sageeru is by further distillation turned into the brandy-like "Kolwater."

Besides greedy man, the sugar-palm has yet a second admirer, the giant chafer *Euchirus longimanus*, which likes to indulge in a drink of the sap during the night. Often it has to pay for its gluttony, by falling a prey to the natives, when they come at sunrise to take away the bamboos filled during the night. The natives call it "Mar-mai-sageeru." This beetle's body attains a length of 2-3 inches. The male's forelegs are, however, so enormously elongated as far to exceed the size of the remaining body, wherefore they form a considerable hindrance to the animal's movements. These monstrous proportions, which render the insect sluggish and clumsy, stand apparently in no connection with its habits of life. It is probable, however, that they are in some way a sexual attribute, as the forelegs of the females are of reasonable size.

The firm black fibre of the vine palm, strongly resembling horse-hair, is used by the Ambonese for rope, and its tenacity offers a greater resistance to the wet, than is the case with ropes made of coconut fibre.

More beautiful to behold, and yet more useful than the vine palm, is the genuine sago palm, *Metroxylon Rumphii*, a fine young specimen of which may be seen on the illustration, page 477, just over the rock in the middle of the picture. The sago is to the eastern half of the archipelago what rice is to its western part. This palm thrives anywhere on the Moluccas, where it finds a favourable, that is to say, a swampy soil, and requires scarcely any attention. As such a tree has the value of a few florins only, and yields enough flour to nourish a man throughout a whole year, it is clear how little labour is necessary to the Malay to support himself, his wife, and children. The economical value of the sago palm has often been commented upon and estimated, foremost of all by Wallace, so that I need not enter into details. It is a fact, however, that where the sago palm grows in great quantities the people lead a sort of Utopian life, and their diligence and energy prove decidedly inferior to those of the inhabitants of districts in which corn or rice is grown.

The starchy substance called sago is nothing but the pith of a full-grown sago tree. This is cut out of the felled trunk of the palm by means of an instrument constructed for the purpose. Then it is washed and kneaded in water, till all the starch is dissolved, and thereupon passed through a strainer into a trough, where it becomes deposited. The sediment thereby obtained is shaped into cylinders and superficially dried. This raw sago, *sagu-manta*, is either simply boiled in water, whereby it swells into a thick glutinous mass called *papeda*, or it is thoroughly dried in the sun, then powdered, and baked into little loaves called *sagu maruka*. Combined with suet and sugar, the sago powder makes a dough which, pleasantly seasoned with pounded canary or coconut, is baked into nice little cakes. Finally, together with sugar and with beaten white of egg it will form a light frothy dish. Several of these cakes and sweetmeats I took with me to Europe, treating my young friends there to Ambonese dainties, which after several months had lost nothing of their original excellence.

The plantations (or *tuine*, as the Dutch say) of Ruma Tiga on Hitu are of particular beauty and richness. Beside the vine and sago palm, and numerous durian, mango, and canary trees, we find extensive plantations of nutmegs and clove trees, to which plants the Moluccas owe their name of Spice Islands. It is said that the clove tree is a native of the Northern Moluccas, Ternāte, and Tidore, whereas the nutmeg has its home south of Ambon on the Banda Archipelago. But the Dutch, on conquering these regions and on establishing their influence in these seas by founding the Dutch-Indian Company in 1622, made the spice trade their monopoly, and confined the cultivation of these valuable products to certain small islands easy to control. Thus they hoped to prevent smuggling. Ambon and the neighbouring Uliassers—Haruku, Saparua, and Nusa Laūt—were selected for the cultivation of clove trees, whereas the islands of the Banda Archipelago were chosen for nutmegs exclusively. All plantations, all wild-growing trees out of the thus selected range were destroyed, and any one laying out new plantations outside the fixed limits was subjected to severe punishment. Thus the Company got all the spice trade into their own hands, and taking care that not more than a certain quantity should come into the market, they were enabled to dictate the price at their pleasure.

In this calculation, however, there was one mistake. In spite of all cutting down of trees, of all intimidating and punishing of

natives, new nutmegs and clove trees *would* incessantly grow up on all sides—on Ceram, Manipa, Kelang, Amblau, and Bouro. This circumstance was due to the habits of the large and handsome fruit-pigeon, *Carpophaga*, a passionate lover of spice trees, especially of nutmegs, the mace of which it digests, whilst casting out the nut with its seed uninjured. Now it is evident that when such birds, after having partaken of a good solid meal, took their constitutional flight from one island to another, they could hardly help spreading the seed in spite of all the prohibitions of a high Government. The hornbill of the Moluccas likewise took part in this mischievous sport, and the Ceram cassowary, *Hyppalectryo galeatus*, did its best to spread the seed all over the large island forming its home.

Soon, however, means were found to prevent the growth of such chance trees on the other Moluccas. Once every year the Governor of the Moluccas undertook an expedition round Ceram and the islands adjoining Ambon, accompanied by a suite of soldiers and officials, and by a whole fleet of native crafts called orembāi. These cruises were called Hongie expeditions. Everywhere detachments were sent on land to destroy all the young growth of spice plants, and cruelly to punish natives who were considered guilty of smuggling.

During two centuries the Moluccas suffered under this monopoly and its severe execution. In 1800, however, the Dutch-Indian Company was dissolved. Eleven years later England took possession of these districts, but returned them to the Dutch once more in 1814. During the short government of the English the monopoly had been abolished. The Dutch, on taking up the reins once more, immediately reintroduced it, but in a milder form than before. In 1824 the Hongie expeditions were done away with; but the monopoly itself was abrogated only in 1873, after having little by little lost much of its importance. This was principally due to the fact that the English had used the period of their power for introducing seedlings of spice plants to the West Indian Islands and Brazil, where they thrived almost as well as in their original home.

Since the abolition of the monopoly, not only the clove tree, *Eugenia caryophyllata* (*Carophyllus aromaticus*), a myrtle species, but also the nutmeg, *Myristica fragrans*, a distant relation of the laurel, have been cultivated on Ambon; indeed the cultivation of the latter may be said to increase, whilst that of the clove tree diminishes. I was told that I would perceive the fragrance of the cloves on

board my steamer ere yet the island was in sight. This may be the case sometimes; I myself, however, did not experience it. Distinctly, however, I noticed the smell when touching at the Ambon quay, where numerous sacks filled with cloves were lying ready for shipping.

The clove tree, called "Tjenke" by the Ambonese, attains a height of 24 to 30 feet. Its growth is even and graceful, the branches beginning to spread a short distance from the ground. The leaves are smooth and shiny, firm, and rather narrow; their colour a vivid green. On crushing them between the fingers they emit the same perfume as the young blossoms themselves, which, plucked and gathered before they open, furnish the well-known spice.

The nutmeg somewhat resembles the clove tree, without, however, being related to it. Its crown is more rounded, and it is somewhat taller than its rival. The Malays call the nutmeg tree *pohon pala*, the nut itself, *bua pala*. The fruit has the size and colour of a small apple, and bears within its outer yellow shell the nut, which is surrounded by a fragrant crimson mace. It is on account of this mace that the nutmeg is sought by the fruit-pigeons, hornbills, and cassowaries, which, removing the outer shell, swallow the fruit whole.

The nutmegs are cultivated in park-like plantations, so-called *Perken*, intermingled with more lofty trees, the spreading foliage of which lavishes its shade upon the growing plants. Generally it is the huge canary tree which is chosen for this purpose. A shady garden of this sort, with its well-kept soil, and its handsome, gracefully-built trees, reminds one very much of a European park. The clove tree plantations, called *Kruidnageltuine*, are devoid of this shady overgrowth, thus furnishing a more tropical aspect.

Great is the number of useful plants on Ambon, be they original inhabitants of the Moluccas or introduced there from foreign countries. I must refrain from enumerating and describing all of them, a task better adapted for the pen of a botanist. Two trees, however, I cannot help mentioning, since their fruit has caused a crab to change its natural habits and to adopt the queerest mode of life. These are the coconut tree (called *Kalapa* by the Malays, *Klapperboom* by the Dutch) and the gigantic canary tree (*Canarium commune*), both very frequent on Ambon. After having on New Guinea become acquainted with a cockatoo (*Microglossus aterrimus*) with a bill resembling a sharp saw or nippers, which enables it to break the stony shell of the canary fruit, I here found a

crab endowed by nature with a similar power. It is the "Palm thief," *Birgus latro*, a crustacean distantly related to the hermit crabs, and having enormous claws possessing the power of opening the strong and resistant shell of the coconut. To attain this end, the crab begins by pulling off the fibrous substance from the lower part of the nut, till it arrives at the three germinal holes or "eyes." These it strikes as with a hammer until the shell bursts, whereupon it extracts the white gelatinous flesh with its thinner and

Palm thief (*Birgus latro*) (one-third natural size).

more dexterous hind-legs. Darwin was the first to notice the curious and quite unique habits of this animal, which he encountered on the Keeling Islands. The aborigines will frequently tell the traveller that, besides breaking and eating the fallen coconuts, the crab will climb upon the trees and nip off the fruit as it hangs. This statement, appearing highly improbable, has met with much contradiction, and has never yet been corroborated by the observation of a white man. Still it does not lie outside the range of possibility. My Ambonese acquaintances assured me that the "Palm thief" was able to break even the stony fruit of the canary tree.

On Ambon our dexterous friend principally follows its thievish

practice during the night, hiding away at daytime in holes and under the roots of trees. From time to time it will repair to the sea, a habit attributed by the people to its desire of moistening its gills. Personally, I consider this motive as very improbable. The gills are very small, but the walls of the cavity containing them are covered with a rich vascular network, and act as a sort of lung. Far more likely does it seem that the crab's periodical visits to the sea are simply for the deposition of eggs, which develop in the water, where the young ones begin life in the good old-fashioned crab style, adopting their extravagant habits later on. I had some difficulty in obtaining a number of these large and savoury crabs for my collection, the Chinese being passionate lovers of this delicacy, for the acquirement of which they pay considerable sums. They keep the crabs, which are as large and heavy as a middle-sized lobster, imprisoned for some time after their capture, and fatten them on coconuts till they attain the desired size.

After having fished for three weeks in the outer and inner bay of Ambon, I could no longer shut my eyes to the fact that the acquisition of *Nautilus* in the stages I desired was not to be hoped for under the circumstances. So I resolved to undertake a longer trip to the east side of the island, and to continue my marine collecting either there or on the coast of the Uliassers. If advisable, I would also cross over to Ceram for a longer stay on the south-east coast of this main island of the Southern Moluccas. As the numerous bottles and preserving fluids necessary for the transportation of my collection required considerable room, I was forced to look about for a larger boat. Luckily one was ready at hand, as Mr. Bouman was able to charter me a prau or orembāi, of exactly the suitable size, for a moderate sum of money. It was a flat open craft of about 30 feet in length, with a small covered cabin in the middle, which, no more than 6 feet square, was just big enough to serve me as bedroom, laboratory, and depository for my collections and instruments. It is true that I was not able to enter my state cabin otherwise than with head bowed down, and that, while at work or occupied in preserving my gatherings, I was literally at a loss how to turn round. Still I had no choice but to resign myself to this royal residence for the three weeks occupied by my little journey.

There are two ways leading from Ambon to Passo. One either circumscribes the whole of Lettimor by boat, or crosses the narrow isthmus which connects the two portions of the island and separates the bays of Ambon and Baguala. A shallow canal,

My Uremia has been

which is merely the continuation of a small river, is cut right across this strip of land. At the highest point of the isthmus the bottom of the canal lies above the high-water mark of the sea, so that one has to drag the small canoes and orembāis across this short space of about a hundred feet. Mr. Bouman desired that this operation should be spared to his prau, wherefore I had to send her on round Lettimor with Udin and seven Mahometan natives from Batu Mera, while I remained at Ambon until their arrival at Passo.

About this time the Resident of Ambon, the highest Government official of the Southern Moluccas, Baron von Hoëvell, had returned from a journey to the Aru Islands, undertaken in his little Government steamer, for the sake of subduing a revolution which had broken out in those parts. I thought it my duty to pay my respects to him as the first official of the country, and to present to him the recommendations from the Governor-General of the Dutch Indies, which that gentleman had given me on the suggestion of the German Consul-General, Mr. Gabriels. Requests of the Resident I had none, my sails and enterprises on Ambon being undertaken quite as independently as all my former expeditions. Special introductions to the lower officials, "Posthouders" and "Kontrollors," on the Uliassers and Ceram might, however, be of some use to me.

The high dignitary received me extremely condescendingly. He graciously promised me some recommendations to the officials in question, and kept the Governor-General's letter in his office to have my name distinctly copied. Four weeks later, and long after I had returned from my trip, I got back this missive without any of the introductions promised me.

On 23rd January, Udin came on foot from Passo to Ambon, to tell me that my orembāi had safely arrived there. While my cook and Edward walked to Passo, I repaired there in my little canoe with Udin and another fisherman. On crossing the inner bay of Ambon I noticed in different spots the extensive fish-garths of bamboo, erected by the Malays for the sake of catching the fish at high-water. On the whole, the Malays are great experts in fishing. They capture the fish in weels and weir-baskets made of rattan, such as are seen lying about in great numbers in all the villages of the coast. They manufacture immense nets, by which they manage to shut in large swarms of fish, which are thus caught in enormous quantities. In shallow water and in the rivers they use circular throwing-nets, which are thrown out closely folded, and unfold in falling, so that they cover a considerable extent.

These nets proved very useful to me for catching fresh-water fishes, to which I directed my special attention. The Malays also practise fishing at night by torchlight, and the sight of the hundreds of fishing-boats and their torches moving about on the calm waters of the bay often reminded me vividly of the well-known scenes I had so often admired on the beautiful Gulf of Naples. The torch of the Ambonese consists of a roll of palm leaves, filled with the sap of *Dammara alba*, a tree common on the island, and, like all tropical pines, in its shape reminding me somewhat of our poplars. At sunrise the fishing-boats are wont to return, those which have had an abundant yield proclaiming their good luck by merry songs and by the sound of gongs and cymbals, whilst others, less content with their harvest, row back to their home silently.

On crossing the inner bay we had a good breeze, and were able to sail before the wind without touching an oar; soon, however, the weather got becalmed, and now, as on other occasions, I remarked that Udin and his companion strove to call back the wind by whistling and sprinkling water in the direction whence they wanted it to blow. This fishermen's superstition is far spread. My white sailors on Thursday Island likewise believed in it, and never tired of trying thus to raise the stubborn breeze. As to the Papuans, they are firmly persuaded of a power of exorcism to call or send away rain and wind at pleasure.

The isthmus of Passo is not more than 4000 feet broad, and consists of flat alluvial land. It might easily be cut through by a regular canal, but this is not done, since every spring-tide would throw up just such sand-banks as those which now obstruct the passage.

Passo is situated on the eastern side of the isthmus, with a charming view over the bay of Baguala. On the next day our orembāi took us to Suli, where I stayed half a week, this spot proving very rich in marine productions.

The village of Suli lies in a small sheltered bay, into which a little river pours its waters. A fine barrier reef surrounds part of the coast, its outer edge showing a luxuriant coral growth, whilst the edge of the reef next the coast is dead and decomposed in its inner parts. During a certain stage of the tide this decayed inner portion of the reef may be said to form a little lagoon open towards the west, whilst to the east it is bounded by the Suli promontory. This structure is a good illustration of the fact that formations reminding us of lagoons or of reef-channels may very well arise by subsequent destruction or erosion, and that Darwin goes too far in attributing

all such configurations to subsidence. I must, however, remark that the structure in question was by no means a typical lagoon, and that the configuration of the coast, which I am unable to describe without giving proper illustrations, easily explains the existence of this formation; while the origin of the Great Barrier Reef of Australia appears to me absolutely inexplicable on any but the subsidence theory of Darwin. Thus I once more arrive at the conclusion that Darwin's explanation is valid for the greater majority of cases, and for all the typical ones; but that apparently similar results have also been reached by other means—by a certain configuration of the ground and coast, and by erosion of the reef. Such analogous but not homologous formations will, however, rarely if ever show strictly regular shapes, or the extent of the barrier-reefs and the atolls formed by the process of subsiding.

The rocks of the east coast of Hitu rise everywhere steeply out of the sea. On approaching them closer, one finds that they are composed of recently raised coral reefs, the coralline structure of which is still obvious. The fauna of these fossil reefs is identical with that of the living reefs underneath. 120 feet above Suli I found an extensive plateau, consisting entirely of coral rock. Above this plain I saw further reefs arise, which again showed a certain terrace-like shape. This structure of the fossil reefs I observed all along the east coast of Hitu, as far as Waai, and I will enter upon the nature of these formations later on.

The soil of the first reef-terrace above Suli does not seem very fertile, and I looked in vain for a more luxuriant forest vegetation, slight vestiges of it appearing only in a very few places. It is probable that the porous coral rock allows the moisture to ooze into the depth too rapidly. On my approaching this height for the first time, and looking round among the light forest which covers it, I was quite struck to find myself apparently transported to Australia again. As within the Australian bush, the trees were growing at wide intervals from each other, and the look of each single tree reminded me most vividly of the tea trees on the banks of the Burnett; and, in fact, the trees I saw were closely allied to the white-blossomed tea tree, *Melaleuca linariifolia*, being but another species of the same family, namely, *Melaleuca minor*, the so-called Kajéput tree. The leaves of this plant furnish the well-known ethereal Kajéput oil, which is manufactured on Ambon and particularly on Bourou. Kajéput is the distorted form of the Malayan *Kaju puti* (*kaju* meaning "wood," and *puti* "white"). The bark of

these trees is of a shiny white, and inclined to detach itself in a ragged manner from the trunk.

Up here I saw great quantities of pigeons, several species of the handsome large *Carpophaga* (*C. perspicillata* and *C. aenea*) and a number of smaller species. They used to swarm about the forests at daytime, assembling at sunset in some of the enormous trees crowning the plain, and taking up their position at such a height, that I was unable to bring them down by shooting. The habit these pigeons have of following their pursuits, each by itself, during the day, assembling only in the evening on certain trees singled out for their nightly repose, I have never observed but in their case, and that of herons. Several times I stole out on moonlight nights to shoot specimens of *Phalanger maculatus*, a species of *Cuscus* very frequent on Ambon. Flying-foxes also abounded in these parts, but I contented myself with killing one of them, which, in the dusk of a fine evening, had offered itself to my gun in an irresistibly tempting way. I was still too sick with the slaughter of these innocent beasts I had executed at Cooktown to secure a series of their developing young.

Very remarkable to me were the numerous caves I discovered near the edge of these coral terraces. Similar though smaller excavations I had already found at Batu Mera near Ambon, where I had seen them perforating the fossil reef close above the surface of the sea.

The results of marine fishing were very abundant in these parts, as the sandy ground, the living and the dying reef furnished habitations and hiding-places for a heterogeneous assemblage of animals. Thus the decayed coral reef was alive with gigantic *Synaptas*, a family of *Holothuria* conspicuous by their tender, in the younger specimens almost transparent, skin, which is beset by small calcareous plates, circlets, and anchor-shaped hooks. This armour would render the animal a very unpleasant morsel in any mouth, the saliva of which is not provided with a considerable quantity of sulphuric acid. By means of their anchor-shaped hooks, the animals are able to attach themselves like burs to any object which comes in contact with them. The *Synaptidae* of the Mediterranean are mere dwarfs compared with their relatives in the tropical seas, which attain a length of several feet. I collected five different species of these curious animals, none of which seemed to have their habitations in the sand or under stones, all apparently spending their lives in crawling freely about the sea bottom. Their colour is so similar to that of the sand that it evidently secures them a

considerable protection against attack. Moreover, they seemed to favour the shallow water close to the shore, where their most formidable foes, the great sea snails, are unable to attack them. Besides their hooks, the *Synaptas* have yet another means of protection against an enemy. When grasped in any part of their long wormlike body, the head with the adjacent parts separates itself from the rest, bidding adieu to its postcephalic portions which, without apparent regret, are abandoned to the foe. Our lizards enjoy a somewhat similar advantage, but they cannot dispense with more than the tail, whilst the more lowly-organised *Holothurian* does not mind sacrificing three-quarters of its body or more. As long as its head with its central nervous system remains undamaged, the rest of the body can be soon regenerated.

The work with throwing nets in the little river of Suli brought us a good harvest of fresh-water fishes, some fine specimens of which were also brought to us by the natives of the village. On the whole, I was rather annoyed by the uncommon curiosity and obtrusiveness of the Suli "society." Though for the greater part Christians, possessing schools, and an officially-controlled "education," the manner in which these good people stared at me and examined all I did reminded me very much of the savages of New Guinea. The more ludicrous the contempt, therefore, with which the highly-cultivated Ambonese speaks of the low "Orang papua."

Each of the Ambonese villages is governed by a native chief called a "Pati," who very much prefers being designated by the term *Rajah*. On arriving at Suli, I made Udin announce my arrival to the Pati of the place, who did not hesitate to come on board my *orembāi*, putting himself and his house at my disposal. Time, however, showed that whenever I wanted anything my friend the Pati was the last to procure it me. Instead of this, he visited me for hours together on my *orembāi*, when I was occupied in examining my gatherings and in preserving the fresh material. My politely-expressed fears lest I might encroach upon his valuable time, fell upon a deaf ear, and two days went by without my having the courage to remove the unwelcome guest from my narrow cabin, which, stifling as it already was, grew unbearable by his presence. On the third day I made up my mind, and asked the "Rajah by courtesy," in good plain Malayan, to transfer his distinguished person to the outside of my cabin.

The Ambonese sing the following little ditty concerning these village monarchs :—

Pati Suli dan Pati Waai
 Pati dua djadi satu.
 Hati sutji dan hati baai
 Hati dua djadi satu.

The following is an approximate translation of these verses into English :—

The Pati of Suli and Pati of Waai
 Are these not two Patis of similar worth ?
 Thus a heart that is pure and a heart that is good
 Will have the same value all over the earth.

It will be noticed, as a characteristic feature of Ambonese poetry, that not only the end syllables of each line, but all the corresponding words of the little verse are rhymed.

But to return to my narrative ; I must needs affirm that the subjects of the Pati were worthy of their chief, inasmuch as concerning me they showed the most obtrusive curiosity, only stopping short of entering my boat. My morning bathe was a signal for a general assembly of the villagers, who seemed to consider it better than any pantomime, and nobody moved from the shore until I had completed my performance ; nor did the crowd of spectators spare their critical remarks about my doings, which they watched with the utmost eagerness and attention. Pure Malays would never have behaved themselves thus, and their conduct gave an infallible clue to the mixed character of race inhabiting these islands.

Experience made me rather hard-skinned against attentions of this sort, and all I did was to bathe as early as possible, thereby hoping to reduce the number of spectators. As it is, sea-bathing in the tropics affords but a moderate enjoyment, and is not to be compared with a good bracing bathe in the waves of our own seas. The water is lukewarm, so that a swim in it refreshes one far less than a bathe in fresh water or the mere pouring of it over one's body, which is the method mostly practised by the Malays themselves.

From Suli we rowed on to Tial, where we stayed but a short time, as the sea there was not particularly rich in animals. On the shore I saw a great number of weir-baskets and weels of rattan, the manufacture of which seems to be one of the chief occupations of the villagers. Steering first to the east and then to the north, we soon doubled the north-east cape of the bay of Baguala, thereby entering the straits of Haruku. The woody island of Haruku rises from the sea due east of Ambon, while to the south-east we perceive the tiny islet of Molana, Nusa Laüt rising behind the latter at a considerable distance. The larger island of Saparua is completely hidden from our

sight by Haruku. None of these hilly islands, however, attain any very considerable height; the highest point of Haruku does not exceed 1350 feet, whilst those of Saparua and Nusa Laüt are no higher than 1000 feet. The coral rocks encasing the volcanic centre of these islands decline steeply towards the coast, and their delicate, yet characteristic outline, set off by a dark-blue ocean, forms a charming picture, particularly pleasing when suffused by the bluish haze of a fine morning.

Also at Tengga-tengga, where we stopped next, the coral cliff falls off very steeply into the sea. The inhabitants of the east coast of Ambon have hewn steps, sometimes even actual stairs, into the coral rock, so as to facilitate the ascent from the shore to the first reef-terrace. In this place also I observed numerous little caves in the rock similar to those mentioned above.

The view from here is very fine, Haruku lying before us in the east so close that one might almost grasp it, whilst the mighty mountains of Ceram greet us from the north. On the borders of the woods and in the plantations of Tengga-tengga swarmed great quantities of grand, handsome butterflies, the wings of which present a network and dots of blackish-brown on a white ground. These belong to the largest species of Danaidae, *Hestia idea*, and its near relation *Hestia aza*, which we may well designate a mere variety of the former, as my collection contains every possible intermediate stage between the two. The flight of these butterflies is unusually slow and floating, and their wings seem to vibrate in the air, being excessively delicate and as thin as tissue-paper. They will continually wheel round and round the same spot, returning to it as often as they have been driven away, and show themselves so stupid and reckless that they can be very easily caught with a net fixed to a long bamboo. The boldness in the behaviour of this butterfly is due to the fact that the body of the Danaid is nauseous to the taste, and is therefore avoided by birds. Frequent here and in other parts of Ambon was the modestly-coloured female of *Ornithoptera piramus*, but the brilliant emerald-coloured male showed itself very rarely during the time of my stay. I have already had occasion to mention this splendid butterfly in relating my rambles on New Guinea, where I had met with the closely-allied *Ornithoptera pegasus*, probably nothing but a local variety of the Ambon species.

But little rarer are two other ornithopteron species, *Ornithoptera Helena* and *Hippolytus*, likewise two enormous butterflies, the decoration of which consists of a splendid design of yellow spots on a black ground. Seeing these beautiful creatures soar around the

trees and bushes with their soft floating movements, I often involuntarily asked myself whether they were birds or butterflies I saw before me. More swift and lively is the flight of *Papilio Ulysses*, a butterfly which seems to prefer moist quarters. It is somewhat smaller than the smaller *Ornithoptera*, showing on the upper side of its black-rimmed wings a splendidly-brilliant, metallic colour, which changes from light-blue to violet, according to the standpoint occupied by the spectator.

Naturalists have made the interesting observation that some species which occur as well on Ambon as on Ceram, Bouru, and other larger islands of that region, show a finer and richer development on the little island of Ambon than on its more extensive neighbours. On the other hand, closely-related species are known to reach greater dimensions and show more striking brilliancy on the above-named islands than on the enormous area of New Guinea. The reason of this phenomenon is as yet unknown. It might perhaps be that a certain kind living on one of the small islands should have less *various*, though not *fewer*, foes than on a greater area, which generally proves to be richer in species, if not in individuals. This explanation, however, appears to me rather delusive, as it is difficult to believe that the Papuan *Ornithoptera Pegasus*, in the face of any foe, should enjoy advantages from being a trifle smaller than the Moluccan variety *Ornithoptera priamus*. It is, on the whole, a yet unsolved riddle why the insect fauna of the Austro-Malayan region is so conspicuous by its beauty and brilliancy, therein far surpassing the Indo-Malayan. For even if we explain the splendid development of Austro-Malayan birds by the absence of any higher tree-living mammals, the reasoning cannot apply in regard to insects, there being no lack of insectivorous birds within that whole range.

A short survey of the Moluccan fauna will suffice to show us that it is very closely related to that of New Guinea, which fact is further proved by a more especial analysis of all the land and fresh-water animals of the two regions. Leaving aside mammalia, we will find that the Moluccan forms, though not absolutely identical with the Papuan, show throughout the most striking resemblance to them. Though the family of the birds-of-paradise is wanting on the Moluccas (save for a single species, the curious *Semioptera Wallacei* of Batchian), we find cockatoos in great numbers. The most conspicuous among the parrots belong to the genera *Lorius*, *Eos*, and *Electus*, which are also frequent on New Guinea, and in Australia. As to snakes, we find on the Moluccas the Australian brown snake

Diemenia, and death-adder (*Acanthophis*), though in each case represented by a species peculiar to the region; and of lizards we encounter *Cyclodus*, likewise a characteristic inhabitant of Australia. Still we everywhere find these forms mingled with others belonging rather to the western part of the archipelago, and which have to be ascribed to an Indo-Malay immigration. Altogether we have the impression of an essentially Austro-Papuan fauna, which has, however, undergone a peculiar development and received many an admixture from the adjacent Asiatic region.

From all this, the reader might form the conclusion that the Moluccas are nothing but portions of the north-west point of New Guinea, which have become detached from that island. This surmise, however, will not bear a closer examination. Firstly, we have to consider that the sea between the real Moluccas and New Guinea is everywhere more than 100 fathoms deep, whereas New Guinea and the chain of islands immediately surrounding its western part lie in an uncommonly shallow sea. At the same time we find that Waigiu, Salawatti, Mysol, and the Aru Islands agree very closely with New Guinea in their species of birds and mammalia. They are alive with birds-of-paradise and arboreal marsupials, besides containing two kinds of kangaroo (the *Macropus Brunii* of Aru and *Dorcopsis Mülleri* of Mysol and Salawatti), and bandicoots (the *Perameles Cockerelli* of Salawatti and *Perameles Doreyana* of Aru). The result therefore at which we arrive is, that there existed a recent land connection between these latter islands and New Guinea. Whether this extended to the Kei Islands which lie outside the 100-fathom line is dubious. Wallace considers them as part of the real Moluccas, though the presence of the kangaroo, *Macropus Brunii*, seems to me to intimate a former land connection.

Kangaroos and bandicoots are entirely wanting on all the real Moluccas, whereas the existence of arboreal marsupials there is easily explained by their faculty of clinging to driftwood with their sharp claws, so as to be easily transported from island to island. Thus we find *Phalanger maculatus* and *orientalis* (var. *typicus*) on the South Moluccas, *Phalanger ornatus* on the North Moluccas, and *Petaurus breviceps* (var. *papuanus*) on several of these islands.

Very conspicuous is the occurrence on Ceram of a large bird devoid of wings, the helmeted cassowary (*Hippalectryx galeatus*), a native of New Guinea. Most probably its presence on Ceram, a remarkable fact, has to be attributed to man's agency. The sea-faring Malays like to keep birds and mammals as pets on their

long navigations, and have most likely introduced it into the island in that way.

We may therefore be certain that none of the Moluccas have been directly linked to New Guinea within a recent geological epoch. All the phenomena which we have observed may be very readily explained by a transmarine immigration from coast to coast.

As unlikely as a connection with New Guinea appears a connection of the Moluccas with any part of the Oriental region, at least within any period of moment for the origin of most of their present fauna. And though we might at first sight suppose that Bouro and Halmahera were once united to Celebes, or Halmahera to the Philippines, this supposition meets with so direct and palpable a contradiction on comparing the Moluccan fauna with that of both the Philippines and Celebes, that we are forced at once to discard the idea. Besides we find that a zone of very deep water intervenes between the Moluccas and Celebes, its depth everywhere exceeding 1000 fathoms, excepting a narrow strip of sea extending from East Celebes to Bouro by way of the Sula Islands. But also there the depth is considerably over 100 fathoms. Between Halmahera and Borneo the depth extends to more than 2000 fathoms, between the latter island and the Philippines to considerably more than 100.

Though we cannot deny the existence of several mammals of the Oriental region on the Moluccas, their appearance is so isolated and their range so limited that we arrive at the conviction of their having been introduced by some stray chance or by the agency of man. Beside the Moluccan deer (*Rusa hippelaphus*, var. *moluccensis*) and the common civet-cat (*Viverra zibethica*), both of them animals frequently domesticated by the Malays, and beside some little shrews which may easily have been accidentally conveyed in native praus, we observe two other interesting Celebesian animals: the curious baboon-like *Cynopithecus niger*, and the deer-pig, Babirusa. Since the latter is found on no Moluccan island but Bouro, and besides on the Sula Islands, the fauna of which is identical with that of Celebes, we may suppose that it has entered Bouro by swimming over the intervening straits, which, narrow to this day, were perhaps even more so formerly. The probability of this is further increased by the fact that pigs, the allies of Babirusa, are known as very able swimmers, capable of crossing broad channels of sea with ease and rapidity.

Less easy to explain is the presence of the *Cynopithecus* on Batchian, this island being separated from Celebes by a broad

stretch of sea 1200 fathoms deep. The entrance of this monkey into Batchian by a former land passage appears only possible by way of Sula to Bouro or North Celebes to Halmahera, the depth of the surrounding seas rendering any other passage most improbable. Now *Cynopithecus* is absent both on Bouro and on Halmahera, although the latter island is only separated from Batchian by a very narrow strait, and would undoubtedly have offered the monkey a very rich and more extensive home than the far smaller Batchian. Thus we are led to suppose that these small queer-looking monkeys have been accidentally introduced to Batchian by roaming Malays, and must not therefore be cited as belonging to the real Moluccan fauna. According to Rosenberg, the Sultan of Batchian remembers having heard, when a boy, that during the reign of his grandfather a pair of these monkeys were brought to Batchian. This pair may very well be regarded as the ancestors of all the monkeys of Batchian, which have not yet succeeded in peopling the whole island, much less in spreading over to Halmahera.

We are thus led to the conclusion that we may follow Wallace in attributing the Moluccan fauna, in spite of its admixture of Indo-Malay elements, to the Australian region, designating the Moluccas together with the Papuan Islands more specially as the Austro-Malayan sub-region. According to this arrangement, we will have to draw the dividing-line over the small Malay Islands (Flores to Lombok), and between the group formed by Celebes, Bouton, and the Sula Archipelago, and that formed by Bouro, Obi, Batchian, and Halmahera, thereupon letting it curve round to the east, as proposed by Max Weber.

From Tenggara-tengga we sailed against a strong north-west wind to Tulehu, a tough bit of work. Not far from the latter village appear a quantity of hot springs, covering a very extensive area. Some of them arise from the shore, some from the bottom of the sea several fathoms beneath the lowest water-mark. On sailing along I counted six submarine springs within a distance of less than two miles. They announce their presence by bubbles, rising from the ground at regular intervals. In a certain spot of the shore, where the springs arise from the ground beyond the high water-mark, the aborigines have dug a hole in which they collect the water. It has a temperature of 141° , and possesses a mineral and strongly sulphurous taste. One of my Ambonese men told me that similar springs were also to be found on the southern decline of the Wawani on Hitu. The Wawani and all the other mountains of Hitu, as well as the hills of the Uliassers are of volcanic origin, and that their volcanic activity

Village Street in Tulebu, east coast of Hiti, Amboyna.

is but slumbering is shown by the existence of these submarine springs and of the solfatara mentioned by my Ambonese companions.

My stay at Tulehu, opposite the low, densely-wooded, coral island, Pulu Pombo, was in no way noteworthy. The photograph I give here of its main street will impart to my readers an idea of one of these Ambonese villages and its inhabitants. From Tulehu we sailed to the bay of Waai, all the time fighting against our powerful foe the north-west wind. On our approaching the little village of Waai, the wind and waves grew so violent that our flat orembāi was very near capsizing, and we had great difficulty in finding a sheltered place where we could haul her on land. There was nothing for me but to return to Tulehu, and to wait some days in the hope that the weather would brighten and allow of our trying to cross over to Ceram. Had our little craft been more seaworthy, we might have risked a trial; but the actual state of things forbade an attempt of the kind with my flat and open nutshell, into which the waves splashed continually, and which did not allow of our tacking against the wind. Thus the wicked north-wester remained victorious, and forced me to an inglorious retreat to the tranquil port of my Tanalapan house, where I resolved to spend the rest of my time.

CHAPTER XVIII

FROM AMBON TO BANDA AND THE JOURNEY HOME

AFTER my return to Ambon, I once more resumed my wonted habits. The mornings and forenoons were devoted to collecting marine animals, while the afternoons were spent on expeditions inland, chiefly the study of the raised coral reefs and the completion of my collection of fresh-water fishes and crustaceans. The island possessing but insignificant watercourses, and no part of it having ever been in connection with one of the great continents, it is not surprising that the majority of its freshwater fishes are, strictly speaking, but sea fishes adapted to a life in fresh water. Among the fishes I captured in some of these Ambonese rivulets there is one representing a novel genus, which has been described by Prof. Max Weber, and named *Stiphodon Semoni*.

Several hours of the day I now spent in dredging, without, however, attaining any very good results. With the fine net I caught a number of splendid Siphonophora, the preserving of which cost me great trouble, as these tender and delicate creatures, on being subjected to the various modes of preservation used to dissolve under my very hands.

At first, particularly, I was very unsuccessful in my attempts, and had to pour away whole pailfuls of such fragments and of specimens unfit for my collections. The hens of my hostess, usually kept in the garden, liked to inspect the hall serving me as laboratory, and they must one day have hit upon rejected fragments of this kind. These had been steeped by me in a mixture of chromic acid and corrosive sublimate, a potion fatal to the poor fowls. Towards dinner-time my hostess came to me, telling me that four of her hens had died. Though feeling slight pangs of conscience, I at first confined myself to an expression of sincere sympathy. Hardly had half an hour passed, when she appeared again, acquainting me with the mournful tidings, "Lajin ajam mati" ("another fowl has died"), and

so on till the evening ; so that whenever she approached my hall I used laughingly to call out to her, "Lajin ajam mati?" On reviewing the slain in the evening, we counted twelve corpses ; another fowl, though alive, appearing in a very unsatisfactory state of health. Happily, however, the latter, more fortunate than its comrades, got over its attack and was all right by the next morning. As for myself, I put a good face on a bad game, paid for the twelve victims of science, and henceforward took care to have that kind of rubbish emptied into the sea.

By my excursions on land I became acquainted with the geological structure of the island. Hitu and Lettimor are geologically of very different structure. While the latter part of the island possesses a granitic core, the basis of Hitu consists of more recent eruptive formations. In 1674 the Wawani on Hitu is said to have burst asunder, thus becoming rifted into two crevices, which emitted streams of hot mud and boiling water. That to the present day signs of volcanic activity exist—the *solfataras* at the foot of Wawani, and the hot springs of the eastern coast—has already been mentioned. Lettimor, however, is devoid of recent volcanic deposit. The peculiar porous stone of a bright red colour, which has given to the little village north of Ambon the name of Batu Mera (Red Cliff), is a kind of laterite, arising from the decay of granite. Towards the coast the mountains are covered by a thick mantle of recent coral formations. The fauna of this coral chalk so resembles that which still abounds in the sea at the foot of these mountains, that we may well assume that the latter were till very recently steeped far deeper in the sea than at present. That which we to-day call Ambon must then have formed a group of small islets of moderate height.

The raised reefs of Ambon, which form a mantle enveloping the hills to a considerable height, showed many peculiar features. Close to the north of Wainitu, where my house was situated, arose a group of hills, outposts of the higher Gunong Nona. On one of these hills, called by the Malays Kati-Kati, I remarked a number of queer cavities along the summit. These were of a circular or elliptic form, some of them, however, more irregularly shaped, the decline of the coral rock towards the level bottom of the cavity being very steep, sometimes almost vertical. One of these cavities, representing an almost regular ellipse, I examined more closely. It showed a length of 144 feet, a breadth of 90, and a depth of about 68 feet. The sheltered little spot had been used for a *djagung* (or Indian-corn) plantation by the aborigines. On another

hill, about 800 feet above the sea, I found two, on another, 170 feet higher, three such cavities.

Gunong Nona itself, a mountain of about 1590 feet, proved to be covered by coral rock as far as the top. The view from the summit is exceedingly beautiful. Here I saw the bright plains of Lertimor and Hitu exuberant in fertility, there the lofty summits of the Salhutu mountain, and to the north-east the still higher peaks of Ceram, whilst the outer and inner bay of Ambon and the unbounded ocean lay extended at my feet, lighted up by the glory of a tropical morning sun. 230 feet below the top I again remarked several of the above-mentioned cavities, some of them possessing an almost perfectly circular shape. With a depth of 70-100 feet, they combine a size of more than 1000, in one case even of 1700, feet. The decline of their sides is, however, not as steep as that of the cavities observed on Kati-Kati. None of these recesses contain any water, nor has one of them been formed by the action of a former or present watercourse, which is distinctly evident from their being closed on all sides. I have no doubt that they have to be regarded as lagoon-like formations of the coral reef, but I am, however, quite unable to explain the circumstances under which these lagoons have been formed.

Everywhere on Gunong Nona and the surrounding hills, as also on other Ambonese mountains, one may notice well-kept plantations of maize, bananas, tobacco, arang, and coconut trees. They have been laid out by the so-called Binungkus, inhabitants of the island of Bouton, south-east of Celebes, and of the adjacent little islets, one of which bears the name of Binungku.

For about twenty-five years these people came in great numbers to Ambon, Ceram, Bouro, and Banda, where they established plantations of all sorts upon the mountains, working them much more diligently and carefully than the lazy Ambonese. Here and there they may also be met with on the coast, where they follow the fishing trade. Generally it is only the men who come to earn a certain amount of money, with which, after a couple of years, they return to their home. They run about naked to the waist, and gave me the impression of being half savages. Their religion is Mahometan.

The cultivated Ambonese think themselves far superior to this modest folk, whose language they do not understand, and whose simple habits they despise. They look down upon them much as an English or German sailor would on a Papuan native. Still I almost always took some Binungkus with me as guides and bearers,

on my expeditions into the country, as they were of far more use to me than the real inhabitants of the island, who were less informed about the mountains and tracks and less reliable in every way than these poor haughtily-treated strangers.

It may be observed from any good point of view that on the bay of Ambon the coral-covered declines of the mountains also fall off towards the sea in terraces, though this formation is not quite so striking as on the east coast of the island. What is the origin of these terraces? It must be assumed that as high as the present coral-mantle reaches, the Ambon mountains were once covered by the sea. On the summit of Gunong Nona we still find enormous *Tridacnas*, identical with the species now living. An upheaval of the land or a subsidence of the water-surface, that process, in short, which is by German geologists designated as a "positive *Strandverschiebung*," has lifted the coral ramparts out of the sea. From the fact that the coral chalk in these places does not form an even mantle but a terraced covering, we can with certainty conclude that this upheaval did not take place gradually and continually, but that it occurred periodically. Now one might assume that at stationary periods the sea-surface for the time being had eaten its way into the coral-mantle of those hills by the corroding action of the surf, thus transforming the rounded contours of the raised coral rocks into the straight and horizontal terraces. This theory has been put forward by a Leyden geologist, Professor K. Martin, who has observed similar terraces on the neighbouring Uliassers, which he consequently designated as "surf-terraces." One circumstance, however, seems to me opposed to his hypothesis—viz. the considerable extent of some of the terraces, their horizontal diameter frequently amounting, as observed by me on Hitu, to one or even several miles. This fact renders it simply impossible to regard the horizontal surface as the product of denudation; for had it been that, the mantle itself would necessarily have possessed a thickness of several miles.

I am inclined to suppose that the corals, within a stationary period, used to push forward straight into the sea in a horizontal direction. Now whenever this period was of a long duration, and the spot favourable for the growth of corals, there would arise flats of a breadth of several miles, while in other less favourable places only narrow strips were formed. If this be so, we have to regard every terrace as a product of coral growth within a stationary period, and not as the work of the denudation of once solid material.

Besides this singular terraced structure, the raised reefs present still another striking phenomenon—viz. the quantity of caves, large and small, to be met with at every level of the fossil rock. At Batu Mera and on the south coast of Lettimor I found small caves in the calcareous rock, immediately above the level of the sea, while on the east coast of Hitu, near Suli and Tengga-tengga, they were to be found in enormous quantities in any part of the rock. The name of the village Liang (the Malayan for cave), on the north-east coast of Hitu, is doubtlessly derived from similar formations in its vicinity. On the south-western extremity of Lettimor I also found a small cave about 300 feet above the sea. I had just at that time been reading an interesting paper by Prof. Johannes Walther, "The Adams' Bridge and the Coral Reefs of Palk Straits." His studies on the living and fossil reefs of the Red Sea and Ceylon had led him to the conclusion that the big gaps and chasms left in their extensive buildings by the little labourers are a standing feature of coralline growth; and, secondly, that these cavities often take the shape of considerable caves, which by the action of currents running through them remain unfilled by chalk sand. Having found cavities of this sort within young fossil reefs, he is thereby led to the conclusion that many fossil caves in continental chalk mountains have to be regarded as structures of similar origin, viz. as former gaps in the growing coral reefs, and that the theory of their being subsequently excavated by the action of flowing water has to be discarded with regard to most of these structures.

On studying the enormous number of smaller and larger caves in the reefs of Ambon, I grew more and more convinced of the truth of this hypothesis. Still there remained a doubt whether the small caves near the shore and in the outer wall of the reef-terraces might be due to the action of surf. And though admitting that the erosion characterising these cavities in itself denoted an unequal solidity of the rock, which is not to be explained otherwise than by the afore-mentioned characteristics of its growth, I was still eagerly bent upon finding some larger caves, the extent and whole structure of which should exclude any action of the surf. In vain did I seek for caves of this kind in the fossil rock, but convinced that such did exist on Ambon, I redoubled my inquiries, and finally succeeded in ascertaining that caves such as I sought were present in different parts of Lettimor, as well as in various places on Hitu.

The finest and most considerable cave of this kind was said to be on the south-east of Ambon, about ten miles from my house. It

bears the name of Liang Ikan (Fish-cave), and is situated close to the entrance of the little river, Batu Gantong, into the sea. I arranged for an excursion thither in company of my Malayan servants, my hostess, her little girl, and her brother-in-law, a Frenchman of tolerable education, who proved helpful to me then and subsequently. The way at first follows the road which leads across the mountains to the south coast of Lettimor. There we took a narrow path which led us through fine woods and plantations to the cave. The latter is situated about 400 feet above the sea, the rocks forming its entrance being covered by a dense mass of vegetation. At first we descended fifteen steps down a slanting way, which led us into a horizontal passage, covered by a vaulted roof and surrounded by almost parallel walls, the height of which ranges between 33 and 50 feet. This passage has a length of about a mile. The ground, though not absolutely horizontal, is tolerably even, and from time to time smaller passages are seen branching off from the main track. By and by the latter begins to show curves and bends, at the same time becoming lower and narrower. Stalactites hang down from the walls, and wherever the dropping water has spared the rock I observed its characteristic coral structure. At the end of the cave, according to my companions, there was a kind of pond or pool, but whether this contained any fish, as the name of the cave seemed to imply, appeared uncertain. The extremity of the cave and the pond were, at the time of my visit, rendered inaccessible by unusual humidity. We everywhere saw the water trickle through the porous chalk rock, though a real watercourse was nowhere to be seen. The ground of the outer half of the cave was, moreover, almost dry.

Udin, who did not accompany me on this trip, told me that similar caves of smaller dimensions were to be found on Lettimor as well as on Hitu. My time, however, did not allow of a visit to these places, a closer study of which I leave to the professional geologist. I believe, however, that the above-named facts furnish sufficient proof of the formation of such structures, for is it not highly improbable that the numerous smaller caves should have been gnawed into the rock by the surf, while the larger ones should owe their existence to erosion by flowing water? The humidity in these caves of porous limestone is very natural, but at the same time it is a striking fact that their interior does not contain the slightest rill or watercourse. Above all, the structure of the caves is very characteristic; for in the living coral reefs I also frequently noticed parallel walls, which ran along in a straight line occasionally inter-

rupted by curves, and which enclosed between each other a band of deep water. From time to time these passages were intercepted by narrow side-channels, so as not to form quite uninterrupted walls. In time the "branches" of these lofty side-walls will meet at the top, and, by interlacing their "tendrils," will produce a cave corresponding with that of Liang Ikan.

From Liang Ikan we repaired to the springs of Batu Gantong, which are situated in a swampy forest of sago palms. Thence the rivulet, bubbling along over steep coral rocks, takes its course towards the sea. At some distance above Wainitu it forms some little cascades, and this is the spot which gave it the name of Batu Gantong, or Hanging Stone; for from the almost vertical wall of rock, the height of which reaches to about 100 feet, projects a mighty boulder, converting the space below into a sort of grotto. The streamlet, encountering this boulder, winds itself round it, and then falls down like a veil into a little rocky basin, which it fills with its fresh and limpid water. Wherever the jutting rocks permit the growth of plants, a dense vegetation has nestled itself to their hard bosom. The loveliest ferns and creepers almost hide away the stone, and every small projection is occupied by some shrub or tree. This charming haunt was my bathing-place, where, on returning from hot climbs along the scorching rocks, I used to gather new strength. The water in the little pool was of a delicious freshness, which communicated itself to my whole being, stirring up my energies like a stimulating draught. By swimming through the watery veil formed by the fall, I entered the little grotto above mentioned, where I could fancy myself shut off from the world.

My time at Ambon approached its end. On the 26th of February the *Both* was to stop at the island. I was going to use her for a visit to the Banda Sea, whence I meant to set out on my journey back.

On the 25th of February, two days before starting, I witnessed another interesting sight, the Chinese New Years' Festival, called by the Malays *taün baru tjina*. Though going on for a whole week, the first day is marked by the principal solemnities, for in the afternoon takes place the grand *teng-teng*, that is a festive procession of all the Chinese children, who, clad in brilliant array, are drawn around the streets by Coolies, in carts fantastically decorated. In the evening all the Chinese houses were illuminated, and the lads of Ambon, curiously disguised, roamed from house to house dancing a queer sort of reel called *tjekiba*. In the middle of the

Batu Gantong, Amboyna.

night they came to my house, asking me to allow them to perform before me in my garden. Expecting to see an interesting national performance, I gladly agreed. Great was my disappointment on seeing that the "national" dance turned out to be nothing but a distorted kind of lancers, danced by eight dusky pairs. The taller, bearded performers, had donned the state uniform of European admirals or generals, while the slighter beardless youths had encased themselves in white ball-dresses, presenting the appearance of elegant young ladies. A closer inspection enlightened me as to the true nature of these fair maidens, who were nothing but real Ambonese "gamins." As no girl deigns to take part in the tjekiba, the lads have to supply their place. The commands in this queerest of lancers were given out in distorted, Ambonised, French, and the whole comedy was accompanied by repeated clapping of hands, and ended in a general chorus of the song then reigning on Ambon. Its melody went as follows, and could be heard all day long in every street, from every house, nook, and corner of the town, being a favourite of great and small, like the celebrated Piedigrotta songs so dear to the Neapolitan's heart.



Whence this melody has sprung, and whether it is of Portuguese or Spanish origin, I was unable to ascertain, but I am quite sure that it is no product of the island. It is applied to any words, and one of the prettiest verses sung to its tune runs as follows :—

Dari Ambon menjabrang Banda,
Kali hatang gunong api,
Siser rambut, menimbang badang,
Liat di mata, sedap di hati.

or—

From Ambon to Banda pass along o'er the sea,
Where the river and mountain of fire you will see ;
Shining your body and glossy your hair,
Joyous your heart and your face bright and fair.

This little ditty served me as a hint to bid farewell to lovely Ambon and its interesting inhabitants, and to wend my steps home-

wards, after having once more opened my eyes and taken in the beauties of Banda and its mountain of fire.

On 26th February the *Both* landed at Ambon, and on the afternoon of the 27th I went on board, soon leaving behind me the wonderful island, where I had spent such a peaceful time, and had gathered excellent material for my studies.

Ombak puti, ombak datang dari laüt
Kipas lenço puti, tana Ambon suda djaü.

or—

White as the foam of the sea
Is the kerchief that waved unto me.
Farewell, fair Ambon, my heart stays with thee !

This graceful little song sounded in my ears, as the well-known form of my provisional home faded in the distance.

The next morning we arrived at the Banda Archipelago, the *Both* anchoring in the little strait between Gunong Api and Neira, close to an old Portuguese fortification called Belgica. Behind Neira appeared the loftier hills of Lonthor (or Great Banda), the range of which forms a regular crescent. Whereas the islands of Neira and Lonthor are covered by a dense vegetation of evergreen plants, the island of Gunong Api chiefly consists of a naked volcano 2160 feet high, the summit of which is veiled in a cloud of smoke. The Gunong Api (Fire-mountain) is incessantly active, endangering the fertile neighbouring islands by its eruptions, which are generally followed by violent sea- and earth-quakes. The most formidable eruptions took place in the years of 1690 and 1852. During the catastrophe of 1690, the sea rose 25 yards higher than the highest flood-mark, causing terrible devastation on the coasts of Neira and Lonthor.

As our steamer entered the waters between the isles of Gunong Api, Kraka, and Neira, I formed the distinct impression that the small basin, now filled by water, is nothing but the crater of an ancient volcano, the broken walls of which are still to be perceived in the ring of islands surrounding it. In one place these walls had been uplifted by a subsequent eruption, as the result of which the cone of Gunong Api has risen aloft, towering high above its surroundings. Everywhere, however, volcanic agencies are still at work, dominating as it seemed the entire ancient crater, in spite of its being filled up by the sea. Thus I observed evidences of submarine volcanic action, both on the north-west coast of Neira, and on the opposite one of Gunong Api. Bubbles were seen to rise at

regular intervals from the bottom of the sea, which was strewn with numerous boulders. Whether these bubbles were due to hot springs rising from the sea-bottom, as at Tulehu on Ambon, or merely to hot vapours, I was unable to ascertain. The fact, however, that the great crater between Gunong Api, Neira, and Kraka is still active, is beyond doubt. The basin-like shape of the sea between the three islands was far more striking at the time of my visit

The Steamer *Botk* at anchor before Neira, Banda. Above is the old Portuguese Fort Belgica, in the background the Hills of Lonthor.

than it appears from the following map, which is copied from the report of the Challenger Expedition. Evidently the configuration of the coast of Gunong Api, has changed since the time of that expedition. A sketch of this region, which I took on the spot, I do not dare to offer my readers, as it depends on eyesight only, and lacks the exactness of accurate surveying and measuring.

Beyond the circular walls of the ancient crater, now forming the islands of Api, Kraka, and Neira, I noticed another outer belt, which, however, is still more fragmentary than the inner. It is mainly represented by the island of Lonthor, which, in company with the small islets of Pisang and Kapal, is disposed in the shape of a horse-

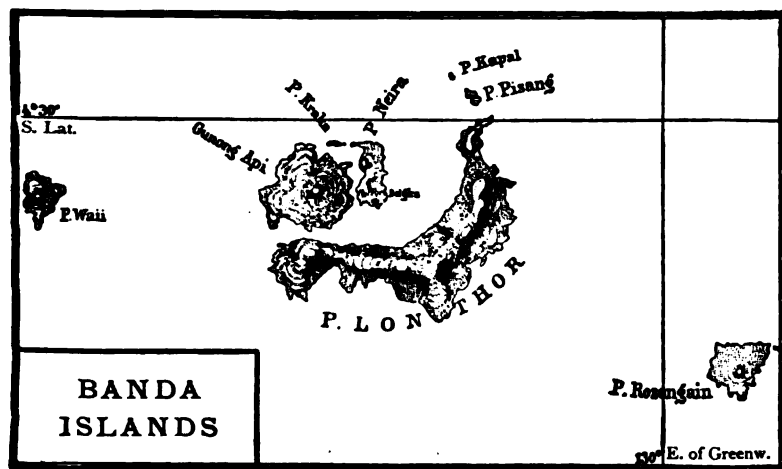
shoe round the inner islands afore-mentioned. The northern and western side of this outer belt have disappeared. Possible it is that the small island of Waii, which lies in a western line from the west coast of Lonthor, should have formed part of the belt, the form of which would then have not been circular but elliptic. This configuration of the volcanic Banda Islands reminds us very strikingly of the Santorin group, a part of the southern Greek Cyclades. There the islands of Santorin, Therasia, and Aspronisi form an outer crater-wall of elliptic shape, while in its centre the islands of Palaea-Kaimeni, Mikra-Kaimeni and Nea-Kaimeni were elevated later on.

The splendid vegetation which clothes the islands of Neira and Lonthor, and which at first sight appears like the densest virgin forest, discloses itself to the approaching traveller as a boundless cultivation of nutmeg trees. For hundreds of years these plantations have been nursed in the shade of lofty canary trees. The soil has been continually levelled and the undergrowth removed, so that the gardens are equal to the finest parks, which they still surpass in size and usefulness. During the time of the monopoly, the cultivation of the nutmeg was only allowed on the islands of the Banda Archipelago—Lonthor, Neira, Rhun, Waii (Aii), and Rozengain. Hongie expeditions to these regions were unnecessary, on account of their isolated situation.

The fauna of Banda is poor, as may be expected from the smallness of the islands and their isolated position. Of mammals we only find some bats and *Phalanger maculatus*. It is not necessary to assume an introduction of the latter into the islands by man, as the Phalanger lends itself uncommonly well to transportation by driftwood, a circumstance I have already had occasion to mention. To its faculty of clinging to drifting timber we may ascribe its distribution over all the archipelago, included Celebes. Banda, however, possesses two kinds of pigeons peculiar to these islands, one of which, the large and handsome species, *Carpophaga concinna*, is very fond of nutmegs, the purple mace of which it digests, while it casts up the nut uninjured, thereby adding to the dissemination of the plant.

Banda is a place devoid of an indigenous population. In 1512 the Portuguese first took possession of the island, keeping it till its conquest by the Dutch in 1609. Easy as it was for the latter to disarm their white rivals, they were soon involved in a bloody contest with the valiant brown children of the soil. Repeatedly surprised and vanquished by the latter, they at length, in the years between 1621 and 1627, succeeded in mastering their brave enemies.

Those among the latter who had escaped death, were made slaves and taken away to Java. The present population of the islands consists of elements introduced by the Dutch from all the different parts of their colonies, and selected with regard to their fitness for working the nutmeg plantations. Thus we find a curious medley consisting of Malays, Alfures, Papuans, and Europeans, and of a race formed by the crossing of all these heterogeneous tribes. All are Christians, and have been free citizens of the State



The Islands of Banda.

since, in 1873, they were released from the pressure of the spice monopoly.

Near the coast of Neira I had some good fishing. The water in these parts is excessively clear and transparent, and my fine net procured me pelagic animals in abundance. The rocks of the coast fall off abruptly into the sea, and are only scantily covered with corals. The transparency of the water is so great, that the minutest objects can be plainly seen at a very considerable depth. I do not remember having ever seen the like of it. The fishermen of Banda also told me that Nautilus was often captured here during the south-east monsoon.

As night set in, the crests of the little waves, which splashed against the rocks of the coast, began to shine in a wonderfully phosphorescent light, while thousands of fiery sparks seemed to cover the oars of my fishermen and my hand, as I dipped it into the water. Phosphorescence of the sea is a most common spectacle in tropical regions, and for me a source of ever new delight on a

long and dull sea voyage. Still I refrain from entering into a description of its beauties, which have so often been described that all I could say would be a mere repetition. Not so, had I witnessed the phosphorescence in these seas during the months of July, August, or September, when the "White Sea" of Banda is said to offer a sight of unparalleled splendour. It extends from there to East Ceram, and owes its far-spread celebrity not only to its uncommon brilliancy, but also to its periodical recurrence. On setting in, during the month of June, the phosphorescence is at first relatively weak, designated as "little white water," while in August and September, when reaching its highest development, it is called "great white water." Doubtless this spectacle is due to the appearance of some excessively luminous and prolific marine organisms. A definite explanation of the wonderful phenomenon must, however, be postponed till a naturalist, staying at Banda during the proper season, shall have minutely studied the real producer of the light.

On the next morning I visited the market or "Pasar" of Banda, which is remarkable for the numerous stands of Arab traders. Afterwards I took a long walk to the fine nutmeg parks of Neira in the company of my only fellow-passenger of the *Both*, Mr. C. Driessen. On the evening of that day, the 1st of March, the good ship *Both* hoisted anchor. This meant for me the turning-point of my journey and the commencement of my return home, and at the same time the termination of my scientific labours for the time being. The remaining months of my journey were to be devoted to mere enjoyment, to repose from the past work, and to the gathering of strength for my new task, that of working out the scientific results of my travels. The only kind of work which, after starting from Banda, interrupted my tourist's idleness, was the fishing of pelagic "Auftrieb" with the fine net, a task followed by me in the different parts of the sea which I traversed on my way home.

Passing Ambon and Macassar, at each of which places I stopped for several hours, my way led me once more to Java. At Buitenzorg I was rejoiced at receiving several specimens of *Manis*, which Dr. I. M. Janse, one of the sub-directors of the Botanic Garden, had been kind enough to collect for me.

In Singapore I remained two days. I admired the beauties of the Straits of Malacca and its wealth of islands, visited the fine Botanic Gardens, which also contain an interesting collection of Malay animals, and enjoyed the brilliant medley of nations and races characterising this interesting and oft-described port. Thence, on the small but excellent steamer, *Catherine Apcar*, I continued my

journey to Penang, and from there straight across the Gulf of Bengal to Calcutta.

By this time we had approached the end of March, and the heat then reigning in Western India was terrific. I had been advised by experienced persons not to travel across that country in April, which, next to May, is the hottest month in those regions. They prophesied that I would have no sort of pleasure from such a trip, which would prove the exact contrary of refreshing after the fatigues of two years' travel in the tropics. Was I then to renounce the beauties which lay so near my path, sights I would perhaps never again have a chance of witnessing? I was sure that I would ever repent such foolish neglect, and at once made up my mind to profit by this splendid occasion, in spite of all well-meant dissuasion, and to trust myself into this furnace, the heat of which is at that time more intense than that of any equatorial region visited by me.

Before undergoing this fiery ordeal I resolved to fill my lungs with some refreshing mountain air, and to betake myself to the slopes of the Himalayas, which it takes not more than twenty-four hours to reach from Calcutta. To look from there on the neighbouring mountain giants is to witness one of the grandest alpine sights of the world.

The heat at Calcutta was perfectly murderous, and grew, if possible, still more insupportable in the train, which at 2.30 P.M. took me off towards Darjeeling in British Sikkim. Towards evening the terrible temperature began to relent, and when crossing the tranquil waters of the Ganges in a steam-ferry, under a starlit sky, I felt like one recovering breath after having been stifled. We took our supper on board the ferry, where we had a doubly enjoyable time after the past tribulations. On going on by train, I fancied myself passing a large town, so many lights did I see close to each other at a short distance from the railway track. The town, however, appeared interminable, and its lights continued to glimmer, now sparkling, now fading, until I perceived that this magic town owed its existence to myriads of fire-flies of an uncommonly large and brilliant kind, which were abroad on their nocturnal wooings.

My night journey was very agreeable. The railway institutions in India are throughout of the best. Every first-class passenger receives for the night a long and broad seat, on which he can stretch out his limbs at pleasure, a servant having prepared a couch for his master by means of the bed-sheet, blanket, and pillow brought on for the purpose. This system is highly commendable, and appears

to me far superior to the costly and relatively uncomfortable sleeping-cars customary in Europe. It is true that the Indian custom takes for granted the aid of a native servant, a luxury indulged in by almost every European travelling in India. You rarely see a European gentleman who is not followed by at least one Hindoo servant, who has also to wait upon his master in the hotels. Thinking it easy to dispense with such an article for the short time of my stay, I warded off all the obsequious natives who offered their services to me at Calcutta. In consequence, I had considerable difficulty in getting properly taken care of when staying at a hotel, and it required any amount of trouble to get my room cleaned and myself waited upon at dinner.

At eight in the morning we arrived at Siliguri, which is situated at the foot of the hills. Here the real railway comes to an end, being succeeded by a steam-tram, which, drawn by a small but powerful engine, carries off the traveller to loftier regions, running up the steep, and to all appearance but lightly-built line at astonishing speed. The narrow cars are open at the sides but covered with an awning, each containing three back and as many front seats. The higher we rose and the deeper we entered into the mountains, the fresher grew the air, soon making us forget the sultry atmosphere already brooding over the plains when we had left them at eight in the morning. Now the vegetation begins to change. Palms and bamboos disappear, making room for tea-plantations, which soon cover all the slopes. Higher and higher we mount, till they, too, are left behind, and, instead, I greet a company of old friends, long unseen—chestnuts, oaks, and birches, cedars, pines, and fir-trees. The human elements, too, begin to change. Instead of the Hindoos, whose looks, in spite of their dusky skin, betray so close a relation to the European type, frequently even surpassing it in the noble cast of both their figures and features, we find in these mountains a clumsily-built, ugly, and very dirty race of strikingly Mongolian character. They are called Lepchas, and are related to the inhabitants of Tibet.

At three o'clock our train had reached the village of Ghoom, and at the same time the highest point of the line, which comes up to about 7500 feet. Thence one descends about 160 feet to Darjeeling. On our arrival there the snowy peaks of the background were wrapped in fog. Still the sight of the little town, nestling so snugly in the bosom of the lofty mountains, was very picturesque; and the rugged, rocky surroundings, the strong and sturdy vegetation, reminded me of many an Alpine village of my European home.

Only the high magnolias and the mighty rhododendrons called back to my mind that I was not strolling about a Swiss village, but that my gaze was centred on a valley of the Himalayas.

On stepping out of my room the next morning, the glorious mountain range lay spread out before me in the blaze of a cloudless sun. The sky was clear and blue, but for a slight silvery mist of a peculiar shape, which in one single spot seemed to hang above the mountains. How strikingly did this cloudlet resemble a snow-covered mountain! Yet the existence of such a thing up there is impossible. Does not the snowy whiteness I perceive float much too high above the earth, and is it not separated from the latter by a space of blue sky? By and by I am joined by other people, who, coming out of their rooms, are struck like myself by the vision. It lasts a considerable time ere we come to believe in the reality of this sight, and in the fact that this silvery phantom is indeed a thing of the earth, namely, the Kinchinjunga, the third in height of all existing mountains. Its loftiest summit attains a height of 26,000 feet, more than double that of the Jungfrau. The snow begins only at about 18,000 feet, which means that the base of the snowy range we see before us is higher than the highest point of Mont Blanc. This, together with the fact that the air-line between us and the Kinchinjunga range amounts to no more than 70 miles, produces the impression of a supernatural loftiness on any one who has till then only seen mountains of moderate, or, as one may say, reasonable height.

During childhood the inhabitant of plains is wont to picture to himself the elevation of an alpine range above the horizon as far greater than it appears in reality, so that many of us undergo a sort of disappointment on first beholding the Alps. In later years, however, and after having seen many mountains, we become practised in judging the dimensions of mountain ranges and their elevation above the horizon. On seeing Kinchinjunga I was subject to the contrary experience. I had now to battle against a feeling of unbelief in the face of the loftiness of these ranges, which really appear to soar above the earth. The snowless region of these mountains is frequently wrapped in a veil of bluish mist, which, resembling the blue of the sky, produces the illusion as if the silvery range floated freely in the heavens. During the three days of my stay this gleaming phantom used to appear to us poor mortals from morning to noon, veiling itself into a robe of clouds and mist during the afternoon.

Darjeeling is a favourite resort of the Europeans living in India, and offers every sort of comfort in the way of good hotels, elegant

private houses, and well-kept walks and pleasure-grounds. Near the village of Ghoom there is a military hospital for such invalids of the Indo-British army as have suffered from the heat and the fevers of the plains. As for myself, though far from being ill, I still came here as one whom the tropical climate had, in the course of two years, robbed of much of his natural zest and energy. Hardly had twenty-four hours elapsed when I was another being—my movements recovered their old spring, I felt up to any enterprise, ate my meals with an appetite and not with the feeling of fulfilling a duty, and I never tired of climbing about the mountains from morning till night, or of taking long rides on horseback. The indefatigable, gentle, and at the same time lively Nepaul ponies, used in these parts, are the most agreeable horses I know of for mountain riding. The vigour I regained by these walks and rides in the bracing mountain air of Darjeeling did not relax on my descending once more into the plains, and enabled me easily to overcome the fatigues of the ensuing month.

Twice I visited Tiger Hill, an elevated point in the neighbourhood of Darjeeling, which, as I was told, presented under favourable conditions a fine view on the chain of the Gaurisankar or Mount Everest. On both occasions the weather frustrated my hopes, and the distant peaks of Gaurisankar, the height of which (29,467 feet), is double that of the Matterhorn, were completely hidden from my sight. I hope, however, that my reader will not mind casting a passing glance on the following picture of that highest mountain of the earth, though I myself was deemed unworthy of eyeing its wonders.

Much as I might relate of Darjeeling, its mountains and people, and its interesting vegetation, I refrain from thus encroaching on my readers' time, knowing how well acquainted most of them will be—by hearsay at least—with the beauties of these Indian regions. What a grand time did I not spend in sauntering through that wonderland, and in viewing the far-famed towns, famous in history, tale, and legend—Benares, the sacred town of the Indians; Agra and Delhi, the splendid residences of the ancient Mogul emperors; Jeypore, the type of a true Indian town, hardly altered by European influence, and picturesque Bombay. What delightful memories attach themselves to these names, what sublime enjoyment did I experience while lingering among these haunts! But so often have their charms been enthusiastically described, that I think it better to go on board the *Assam* in silence—the good ship which was to carry me from Bombay to the distant shores of home. On the 15th of April I took leave of the sunny coasts of India, and ten days later the snow-covered mountains of Crete waved me a bright greeting.

Past the rugged height of Zakynthos, and through the narrow strait between Cephalonia and Ithica our ship carried us to Brindisi. On 28th April we arrived. Spring was reigning in all its radiance over the plains of Italy, spring, that charming season unknown in the tropics, bade me a laughing welcome to dear old Germany.

On looking back on my two years of travel, and on asking myself: "What have they brought me?" it is not the furtherance of my scientific work or the obtaining of very interesting and rare material which is foremost in my thoughts. Far higher do I value their influence on my mode of scientific thought; for it is evident that a travelling naturalist will notice and observe many matters, which he does not think of paying any attention to at home, where he is generally confined to the narrow compass of his special studies. And it is not the splitting or the boundlessness of interest, but the too one-sided, or, may I say, narrow-minded specialising which I consider the chief danger of our so proudly-developed science; for it is the very height of its development which threatens to produce an unlimited number of specialists, each of whom is blind to everything but the narrow sphere of his chosen department. A voyage on the wide ocean of Universal Natural Science is to a naturalist what migration to the sea is to a young salmon. Grown up in the waters of his little river, where he felt so snug and homely, he is unaware of anything beyond this small sphere, till, one fine day, he sets out and sees that there are still more and bigger waters than that which before seemed all the world to him.

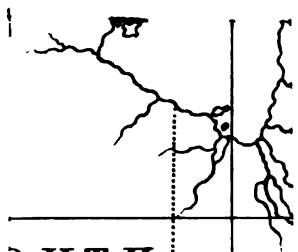
As important as this higher gain, drawn by the naturalist from such a journey, is the furtherance experienced by the man. How valuable is the gain of æsthetic impressions, the practice of the eye and the other senses, the widening of the spiritual horizon, and the ripening of the judgment brought about by the immense enrichment in objects of comparison. Wallace says jestingly that the pleasure of eating Durian is worth a journey to the East. I perfectly agree in his opinion, but I know other prizes which are yet better worth the cost and trouble of such an undertaking. Is it not a gain to our innermost self if, relinquishing for a time the companionship of old friends and relations, we learn to know human beings hitherto strange to us, who, bound to ourselves by no social ties or bands of relationship, receive the foreign wanderer with kindness, and further his interests without the vestige of a selfish thought? Every traveller who does not obstinately shut his soul to experiences of this sort, will feel a growth of his belief in the inborn kindness of human nature, which is easily underrated by him who

has never gone beyond the limits of home, where the disinterestedness of other people's motives rarely stand forth so clearly as among foreign surroundings.

On the other hand, a traveller will not easily be tempted into an over-optimistic view of human nature, the complexity of situations accompanying a voyage of this sort being sure to throw him in with a motley crowd of characters. And one thing, at all events, he will carry home with him—an objective view of human nature, and the certainty that the main factors of life and character, that the main-springs of action are the same in Australians and Germans, in men and women all over the world. He will learn that the same passions, failings, and virtues repeat themselves with endless variations, and that one Great Theme, transposed into a variety of keys, may be heard wherever human beings live, love, and hate. To find out the universal features in human nature, and to study the characteristic of every single variation is a delight in itself, which, in my opinion, can cope with the contemplation of any masterpiece of art, or of the most wonderful landscape.

People have often attempted to calculate the pecuniary value of a colony to its motherland, by a close inquiry into its material products. To such a method others have frequently, and, as I think, justly, opposed the argument that the indirect utility of a colony far outweighs its direct advantage, and that the increase of traffic, the livelier connection with other races, the wealth won by the emigrants out of the self-detected treasures of a virgin soil, a wealth sure to serve the mother-country in some way or other, far surpass the pecuniary balance obtained.

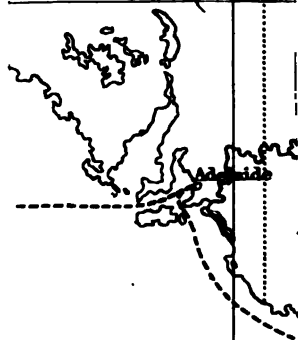
Higher yet than this I am inclined to rate the mental gain attainable to almost any one who will spend some part of his life in foreign parts. The widening of his horizon, the vast increase of his experience are matters of immeasurable value to him for all his remaining life. It is true that for certain natures a prolonged stay in uncultivated, far-off countries and foreign climates, under irregular social conditions, may lead to vice and brutality. The majority of young men, however, who are allowed to lay hands to the pioneer-work in the colonies, are sure to go forth strengthened and enriched by their years of hardship and privation, and the education they gain by their numerous adventures and innumerable impressions will be lost neither to them nor to their country. Thus I deem the ideal value of colonies absolutely equal to their material advantages.



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APPENDIX

ONE HUNDRED AND TWENTY WORDS IN THE LANGUAGE SPOKEN BY THE AUSTRALIANS OF THE MIDDLE BUR- NETT DISTRICT¹

Substantives

Arm	gening	Meat	djam
Bark	gondo	Moon	gullo
Boomerang	barran	Morning	ngolga
Child	kagur	Mother	memme
Club	djabir	Night	mulgen
Daughter	njukoerringon	River	jena
Day	muin	Shield	cumare
Ear	pinnang	Sky	munar
Egg	ngoo	Son	njukoerring
Evening	djuju	Spear	kanne
Eye	mel	Stone	tai
Father	baba	Stream	dongi
Fire	gujom	Sun	jaunan
Flower	bullor	Tongue	djunom
Foot	jinnang	Tree (or wood)	taddo
Grass	bau	Water	kung
Hand	na	Wife	gjubom
Honey	dohl	Wind	boran
Hut (lodging, tent)	gundu	Wood (or tree)	taddo
Leg	jangar	Young man	murun
Man	murun		

Names of Animals

Bandicoot	pinuru	Dasyurus	gumbem
Beetle	jamgon	Eal	imba
Butterfly	boaba	Echidna	cauara
Carpet-snake (<i>Python</i>		Emu	mui
<i>spilotes</i>)	bui	Flying squirrel (Pe-	
Catfish	gidiri	taurus)	wuaa or barbar
Ceratodus	djelleh	Frog	daggam
Cockatoo	giera	Jewfish (Arius)	bolla

¹ The Australian words are to be read according to continental pronunciation.

Names of Animals (continued)

Kangaroo	gruman	Pelican	gorolcápino
Kangaroo-rat (Aepy- prymnus)	barunga	Rock wallaby	guembi
Land-Iguana (Able- pharus)	jimben	Ruff-lizard (Chlamy- dosaurus)	binángaram
Laughing jackass (Paralcyon gigas)	gugaga	Scrub-turkey (Tale- gallus)	wauen
Lizard	cullim	Serpents, poisonous	wonge
Mullet (Mugil cunesii)	ngaria	Spider	munnin
Native bear (Phas- colarctus)	gulla	Squatter-pigeon (Geo- phaps script)	mammin
Opossum (Tricho- surus)	gruna	Turtle	miaro
Ornithorhynchus (duck-bill)	jungjumore	Wallaby	wuaia
		Water-Iguana (Physi- gnathus)	niaram
		Wild duck and goose	monarum
		Wonga pigeon	wung

Pronouns

I	ngea	He	jango
You	njin		

Verbs

Be	nganje	Kill	bumgo
Eat (or drink)	djao	See	njao
Fly (or run)	mjeringe	Sit	ngeno
Have	nkamangare	Sleep	buando
Hear	binan	Swim	gerumjo
Jump	kunaue	Throw	bienge

Adjectives

Bad	nieng	Slow	jeier
Black (dark)	ngurue	Small	baribari
Coloured (red, yellow, green, blue)	beiar	Strong	darrin
Dirty	ngurue-ngurue	Thirsty	kongi
Good	kalang	Weak	birir
Large	jan	White	bambar
Old	gorenga	Young	gagur
Quick	djunga	No	wuakka
		Yes	joei

Numbers

One	garro	Five	boo koromde
Two	boo	Many (any number	
Three	koromde	surpassing five)	meian
Four	wagaro		

SOME NAMES OF *ANIMALS* AND *ARTICLES* WHICH
HAVE BEEN INTRODUCED INTO AUSTRALIA BY THE
WHITES

Horse	jaraman	Sugar	schugei
Cattle	bullā	Tea	ti
Flour	bullor		

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